

U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS—BULLETIN NO. 153.

A. C. TRUE, Director.

PROCEEDINGS

OF THE

EIGHTEENTH ANNUAL CONVENTION

OF THE

ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND
EXPERIMENT STATIONS,

HELD AT

DES MOINES, IOWA, NOVEMBER 1-3, 1904.

EDITED BY

A. C. TRUE and W. H. BEAL, for the Office of Experiment Stations,

AND

H. C. WHITE, for the Executive Committee of the Association.



WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1905.

THE AGRICULTURAL COLLEGES.

ALABAMA— <i>Auburn</i> : Charles C. Thach, ^a <i>Normal</i> : Wm. H. Councill. ^a <i>Tuske-</i> <i>gee</i> : Booker T. Washington. ^b	NEBRASKA— <i>Lincoln</i> : E. Benjamin An- drews. ^c
ARIZONA— <i>Tucson</i> : Kendrick C. Bab- cock. ^a	NEVADA— <i>Reno</i> : Joseph E. Stubbs. ^a
ARKANSAS— <i>Fayetteville</i> : Henry S. Hartzog. ^a	NEW HAMPSHIRE— <i>Durham</i> : Wm. D. Gibbs. ^a
CALIFORNIA— <i>Berkeley</i> : Benjamin Ide Wheeler. ^a	NEW JERSEY— <i>New Brunswick</i> : Austin Scott. ^a
COLORADO— <i>Fort Collins</i> : Barton O. Aylesworth. ^a	NEW MEXICO— <i>Mesilla Park</i> : Luther Foster. ^a
CONNECTICUT— <i>Storrs</i> : R. W. Stim- son. ^a	NEW YORK— <i>Ithaca</i> : Jacob Gould Schurman. ^a
DELAWARE— <i>Newark</i> : Geo. A. Harter. ^a <i>Dover</i> : W. C. Jason. ^a	NORTH CAROLINA— <i>West Raleigh</i> : G. T. Winston. ^a <i>Greensboro</i> : James B. Dudley. ^a
FLORIDA— <i>Lake City</i> : Andrew Sledd. ^a <i>Tallahassee</i> : Nathan B. Young. ^a	NORTH DAKOTA— <i>Agricultural College</i> : J. H. Worst. ^a
GEORGIA— <i>Athens</i> : H. C. White. ^a <i>Col-</i> <i>lege</i> : R. R. Wright. ^a	OHIO— <i>Columbus</i> : William Oxley Thompson. ^a
IDAHO— <i>Moscow</i> : J. A. MacLean. ^a	OKLAHOMA— <i>Stillwater</i> : Angelo C. Scott. ^a <i>Langston</i> : Inman E. Page. ^a
ILLINOIS— <i>Urbana</i> : E. J. James. ^a	OREGON— <i>Corvallis</i> : Thos. M. Gatch. ^a
INDIANA— <i>Lafayette</i> : Winthrop Ells- worth Stone. ^a	PENNSYLVANIA— <i>State College</i> : George W. Atherton. ^a
IOWA— <i>Ames</i> : Albert Boynton Storms. ^a	RHODE ISLAND— <i>Kingston</i> : Kenyon L. Butterfield. ^a
KANSAS— <i>Manhattan</i> : Ernest R. Nich- ols. ^a	SOUTH CAROLINA— <i>Clemson College</i> : P. H. Mell. ^a <i>Orangeburg</i> : Thomas E. Miller. ^a
KENTUCKY— <i>Lexington</i> : J. K. Patter- son. ^a <i>Frankfort</i> : James S. Hatha- way. ^a	SOUTH DAKOTA— <i>Brookings</i> : James Chalmers. ^a
LOUISIANA— <i>Baton Rouge</i> : Thos. D. Boyd. ^a <i>New Orleans</i> : H. A. Hill. ^a	TENNESSEE— <i>Knoxville</i> : Brown Ayres. ^a
MAINE— <i>Orono</i> : George Emery Fel- lows. ^a	TEXAS— <i>College Station</i> : David F. Houston. ^a <i>Prairieview</i> : E. L. Black- shear. ^b
MARYLAND— <i>College Park</i> : R. W. Sil- vester. ^a <i>Princess Anne</i> : Frank Trigg. ^b	UTAH— <i>Logan</i> : W. J. Kerr. ^a
MASSACHUSETTS— <i>Amherst</i> : Henry H. Goodell. ^a	VERMONT— <i>Burlington</i> : M. H. Buck- ham. ^a
MICHIGAN— <i>Agricultural College</i> : J. L. Snyder. ^a	VIRGINIA— <i>Blacksburg</i> : J. M. Mc- Bryde. ^a <i>Hampton</i> : H. B. Frissell. ^b
MINNESOTA— <i>St. Anthony Park, St.</i> <i>Paul</i> : Cyrus Northrop. ^a	WASHINGTON— <i>Pullman</i> : E. A. Bryan. ^a
MISSISSIPPI— <i>Agricultural College</i> : J. C. Hardy. ^a <i>Westside</i> : W. H. Lan- nier. ^a	WEST VIRGINIA— <i>Morgantown</i> : D. B. Purinton. ^a <i>Institute</i> : J. McHenry Jones. ^b
MISSOURI— <i>Columbia</i> : R. H. Jesse. ^a <i>Jefferson City</i> : B. F. Allen. ^a	WISCONSIN— <i>Madison</i> : Chas. Richard Van Hise. ^a
MONTANA— <i>Bozeman</i> : Jas. M. Hamil- ton. ^a	WYOMING— <i>Laramie</i> : Frederick M. Tis- del. ^a

^a President.

^b Principal.

^c Chancellor.

U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS—BULLETIN NO. 153.

A. C. TRUE, Director.

PROCEEDINGS

OF THE

EIGHTEENTH ANNUAL CONVENTION

OF THE

ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND
EXPERIMENT STATIONS,

HELD AT

DES MOINES, IOWA, NOVEMBER 1-3, 1904.

EDITED BY

A. C. TRUE and W. H. BEAL, for the Office of Experiment Stations,
AND

H. C. WHITE, for the Executive Committee of the Association.

WASHINGTON:
GOVERNMENT PRINTING OFFICE..

1905.

OFFICE OF EXPERIMENT STATIONS.

A. C. TRUE, Ph. D.—*Director.*

E. W. ALLEN, Ph. D.—*Assistant Director and Editor of Experiment Station Record.*

W. H. BEAL—*Chief of Editorial Division.*

WALTER H. EVANS, Ph. D.—*Chief of Division of Insular Stations.*

JOHN HAMILTON—*Farmers' Institute Specialist.*

MRS. C. E. JOHNSTON—*Chief Clerk.*

EDITORIAL DEPARTMENTS.

E. W. ALLEN, Ph. D., and H. W. LAWSON—*Chemistry, Dairy Farming, and Dairying.*

W. H. BEAL—*Agricultural Physics and Engineering.*

WALTER H. EVANS, Ph. D.—*Botany and Diseases of Plants.*

C. F. LANGWORTHY, Ph. D.—*Foods and Animal Production.*

J. I. SCHULTE—*Field Crops.*

E. V. WILCOX, Ph. D.—*Entomology and Veterinary Science.*

C. B. SMITH—*Horticulture.*

D. J. CROSBY—*Agricultural Institutions.*

NUTRITION INVESTIGATIONS.

W. O. ATWATER—*Chief.*

IRRIGATION AND DRAINAGE INVESTIGATIONS.

ELWOOD MEAD—*Chief.*

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D. C., March 15, 1905.

SIR: I have the honor to transmit herewith for publication Bulletin No. 153 of this Office, containing the proceedings of the Eighteenth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations, held at Des Moines, Iowa, November 1-3, 1904.

Respectfully,

A. C. TRUE,
Director.

HON. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
Officers and committees of the association	7
List of delegates and visitors in attendance	9
Constitution of the association	11
Minutes of the general session	15
Resolution relating to Association of State Universities	15
Report of the executive committee	15
Report of treasurer	19
Report of bibliographer	20
Collective college and station exhibit at St. Louis	25
Communication from National Association of State Universities	28
Uniform fertilizer and feeding stuff legislation	28
Methods of seed testing	31
Military instruction	31, 63, 69
Indexing agricultural literature	32
Annual address of the president of the association	33
Death of Major Alvord	42
Adams bill and Mondell mining school bill	43
Standing committees	43
Methods of teaching agriculture—The teaching of agriculture in the rural schools	43
The social phase of agricultural education	56
Cooperation between the stations and the U. S. Department of Agri- culture	62
Graduate study	63
Resolution regarding Hon. H. C. Adams	64
Extension of franking privilege	64
Resolution regarding Hon. F. W. Mondell	64
Resolution regarding Maj. Henry E. Alvord	65
Election of officers	65
Meeting place of next convention	66
Rural engineering	66
Animal and plant breeding—American Breeders' Association	68
The upbuilding of agriculture	69
Indexing agricultural literature	76
Resolution regarding Director True and the Office of Experiment Sta- tions	77
Resolutions of thanks	77
Minutes of the sections	79
Section on college work and administration	79
Elementary instruction in land-grant colleges	79
Military instruction	91
Degrees in land-grant colleges	101

Minutes of the sections—Continued.

Section on college work and administration—Continued.	Page.
Election of officers	106
Action on resolutions	106
Technical agricultural education	106
Section on experiment station work	116
Organization of a section on botany and horticulture	116
Federation of agricultural organizations	117
Uniformity of terms used in agricultural analysis	29, 117
Nomination of officers	118
Topics for discussion next year	118
Plant breeding	117, 119
Methods in Breeding Hardy Fruits	119
Improvement in the Quality of Wheat	119
Animal breeding	124
Teaching by station men	130
Index of names	137

OFFICERS AND COMMITTEES OF THE ASSOCIATION.

President.

E. B. VOORHEES, of New Jersey.

Vice-Presidents.

J. C. HARDY, of Mississippi ; C. D. WOODS, of Maine ;
K. L. BUTTERFIELD, of Rhode Island ; E. R. NICHOLS, of Kansas ;
EUGENE DAVENPORT, of Illinois.

Secretary and Treasurer.

J. L. HILLS, of Vermont.

Bibliographer.

A. C. TRUE, of Washington, D. C.

Executive Committee.

H. C. WHITE, of Georgia, *Chair.* ;
J. L. SNYDER, of Michigan ; C. F. CURTISS, of Iowa ;
W. H. JORDAN, of New York ; L. H. BAILEY, of New York.

OFFICERS OF SECTIONS.

College Work and Administration.

R. W. STIMSON, of Connecticut, *Chair.* ; K. L. BUTTERFIELD, of Rhode Island, *Secy.*

Programme Committee.

R. W. STIMSON, of Connecticut ; K. L. BUTTERFIELD, of Rhode Island ;
E. R. NICHOLS, of Kansas.

Experiment Station Work.

H. J. PATTERSON, of Maryland, *Chair.* ; M. A. SCOVELL, of Kentucky, *Secy.*

Programme Committee.

J. F. DUGGAR, of Alabama ; C. D. WOODS, of Maine ;
M. A. SCOVELL, of Kentucky.

COMMITTEES.

Indexing Agricultural Literature.

A. C. TRUE, of Washington, D. C., *Chair.* ; W. M. HAYS, of Minnesota ;^a
T. F. HUNT, of Ohio ; E. DAVENPORT, of Illinois ;
JOSEPHINE A. CLARK, Librarian U. S. Department of Agriculture.

^a Now Assistant Secretary U. S. Department of Agriculture.

Methods of Teaching Agriculture.

A. C. TRUE, of Washington, D. C., *Chair.*; H. T. FRENCH, of Idaho;
 T. F. HUNT, of Ohio; H. H. WING, of New York;
 J. F. DUGGAR, of Alabama.

Collective College and Station Exhibit, St. Louis.

W. H. JORDAN, of New York, *Chair.*; W. E. STONE, of Indiana;
 A. C. TRUE, of Washington, D. C., *Secy.*; T. F. HUNT, of Ohio;
 H. J. WATERS, of Missouri; C. F. CURTISS, of Iowa;
 W. M. HAYS, of Minnesota; J. K. PATTERSON, of Kentucky;
 H. W. TYLER, of Massachusetts.

Graduate Study.

L. H. BAILEY, of New York, *Chair.*; A. C. TRUE, of Washington, D. C. :
 J. E. STUBBS, of Nevada; R. H. JESSE, of Missouri;
 M. H. BUCKHAM, of Vermont; W. O. THOMPSON, of Ohio.

Uniform Fertilizer and Feeding-Stuffs Laws.

H. J. WHEELER, of Rhode Island, *Chair.*; C. D. WOODS, of Maine;
 H. P. ARMSBY, of Pennsylvania; E. H. JENKINS, of Connecticut;
 M. A. SCOVELL, of Kentucky.

Military Instruction in Land-Grant Colleges.

G. W. ATHERTON, of Pennsylvania, *Chair.*; H. H. GOODELL, of Massachusetts;
 ALEXIS COPE, of Ohio; R. H. JESSE, of Missouri;
 H. C. WHITE, of Georgia.

Cooperation between Stations and U. S. Department of Agriculture.

E. A. BRYAN, of Washington, *Chair.*; H. J. WATERS, of Missouri;
 W. A. HENRY, of Wisconsin; L. G. CARPENTER, of Colorado;
 H. H. GOODELL, of Massachusetts; B. T. GALLOWAY, of Washington, D. C.

Pure-Food Legislation.

W. A. WITHERS, of North Carolina, *Chair.*; W. FREAR, of Pennsylvania;
 H. J. PATTERSON, of Maryland; H. J. WHEELER, of Rhode Island;
 A. T. NEALE, of Delaware.

Animal and Plant Breeding.

W. M. HAYS, of Minnesota, *Chair.*; T. F. HUNT, of New York;
 C. F. CURTISS, of Iowa; L. H. BAILEY, of New York;
 H. J. WEBBER, of Washington, D. C.

Rural Engineering.

W. E. STONE, of Indiana, *Chair.*; S. FORTIER, of Montana;
 A. R. WHITSON, of Wisconsin; C. F. CURTISS, of Iowa;
 ELWOOD MEAD, of Washington, D. C.

Methods of Seed Testing.

E. H. JENKINS, of Connecticut, *Chair.*; F. W. CARD, of Rhode Island;
 W. R. LAZENBY, of Ohio; E. BROWN, of Washington, D. C. ;
 A. D. SHAMEL, of Washington, D. C.

LIST OF DELEGATES AND VISITORS IN ATTENDANCE.

Alabama: J. F. Duggar, C. C. Thach.

Arizona: K. C. Balcock.

Colorado: W. L. Carlyle, L. G. Carpenter.

Connecticut: C. L. Beach, E. H. Jenkins, R. W. Stimson.

Delaware: G. A. Harter, A. T. Neale.

Georgia: J. M. Kimbrough, R. J. Redding, H. C. White, Mrs. H. C. White.

Idaho: G. A. Crosthwait, H. T. French, J. A. MacLean.

Illinois: E. Davenport, W. J. Fraser, C. G. Hopkins, E. J. James.

Indiana: W. E. Stone.

Iowa: R. C. Aulmann, H. P. Baker, G. W. Bissell, F. W. Bouska, R. E. Buchanan, A. N. Carstensen, G. I. Christie, C. F. Curtiss, W. Dinsmore, C. O. Dixon, C. E. Ellis, A. T. Erwin, C. W. Gay, B. O. Gammon, W. Gammon, P. G. Holden, J. J. Hooper, T. S. Hunt, J. W. Jones, L. S. Klinck, E. E. Little, G. L. McKay, J. H. McNeil, M. L. Merritt, L. H. Pammel, R. Rueda, W. J. Ruth-
erford, W. H. Stevenson, A. B. Storms, H. E. Summers, O. W. Willcox, C. J.
Zintheo.

Kansas: E. R. Nichols, Mrs. E. R. Nichols, R. C. Nichols.

Kentucky: J. K. Patterson, Mrs. J. K. Patterson, M. A. Scovell.

Maine: G. E. Fellows, C. D. Woods.

Maryland: J. R. Owens, H. J. Patterson.

Massachusetts: H. Hayward.

Michigan: C. D. Smith, J. L. Snyder, L. W. Watkins, Mrs. L. W. Watkins,
P. H. Wessels.

Minnesota: W. M. Hays, Mrs. W. M. Hays, W. M. Liggett, Mrs. W. M. Liggett,
M. H. Reynolds, H. Snyder.

Mississippi: J. C. Hardy.

Missouri: R. G. Finney, G. G. Hedgcock, R. H. Jesse, M. F. Miller, F. B. Mum-
ford, C. Wells, F. S. White, W. Williams.

Montana: R. W. Fisher, J. M. Hamilton, F. B. Linfield.

Nebraska: E. B. Andrews, E. A. Burnett, A. Keyser, T. L. Lyon.

Nevada: P. Frandsen, G. H. True, Mrs. G. H. True.

New Hampshire: W. D. Gibbs.

New Jersey: A. Scott, E. B. Voorhees.

New Mexico: L. Foster, Mrs. L. Foster, F. Garcia, J. D. Tinsley.

New York: L. H. Bailey, B. von Herff, W. H. Jordan.

North Carolina: C. W. Burkett, F. L. Stevens.

North Dakota: E. E. Kaufman, L. Van Es, J. H. Worst.

Ohio: A. Agee, J. E. McClintock, H. C. Price, W. O. Thompson, C. E. Thorne,
A. Vivian, F. L. West.

Oklahoma: J. Fields, A. C. Scott.

Oregon: A. L. Knisely.

Pennsylvania: H. P. Armsby.

Rhode Island: K. L. Butterfield, F. W. Card, H. J. Wheeler.

South Carolina: C. E. Chambliss, P. H. Mell.

South Dakota: J. Chalmers, J. W. Wilson.

Tennessee: B. Ayres, C. A. Keffer.

Utah: J. A. Widtsoe.

Vermont: J. L. Hills.

Virginia: E. A. Bishop.

Washington: E. A. Bryan.

Wisconsin: W. A. Henry, G. N. Knapp, E. P. Sandsten, C. R. Van Hise.

Wyoming: B. C. Buffum, F. M. Tisdell.

United States Department of Agriculture: E. W. Allen, E. Mead, of the Office of Experiment Stations.

Government Board, Louisiana Purchase Exposition: W. V. Cox.

Ottawa, Canada: W. Saunders.

Santiago de las Vegas, Cuba: N. S. Mayo.

CONSTITUTION OF THE ASSOCIATION.

NAME.

This association shall be called the Association of American Agricultural Colleges and Experiment Stations.

OBJECT.

The object of this association shall be the consideration and discussion of all questions pertaining to the successful progress and administration of the colleges and stations included in the association, and to secure to that end mutual cooperation.

MEMBERSHIP.

(1) Every college established under the act of Congress approved July 2, 1862, or receiving the benefits of the act of Congress approved August 30, 1890, and every agricultural experiment station established under State or Congressional authority, the Bureau of Education of the Department of the Interior, the Department of Agriculture, and the Office of Experiment Stations of the last-named Department, shall be eligible to membership in this association.

(2) Any institution a member of the association in full standing may send any number of delegates to the meetings of the association. The same delegate may represent both a college and a station, but shall vote in only one section and shall cast only one vote in general sessions. Other delegates may be designated by any institution to represent it in specified divisions of the sections of the association, but such delegates shall vote only in such divisions, and no institution shall be allowed more than one vote in any sectional meeting.

(3) Delegates from other institutions engaged in educational or experimental work in the interest of agriculture or mechanic arts may, by a majority vote, be admitted to conventions of the association, with all privileges except the right to vote.

(4) In like mannner, any person engaged or directly interested in agriculture or mechanic arts who shall attend any convention of this association may be admitted to similar privileges.

SECTIONS.

(1) The association shall be divided into two sections: (a) A section on college work and administration, (b) a section on experiment station work.

The section on college work and administration shall be composed of the presidents or acting presidents of colleges and universities represented in the association, or other representatives of such institutions duly and specifically accredited to this section, and no action on public and administrative questions shall be final without the assent of this section.

The section on experiment station work shall be composed of the directors or acting directors of experiment stations represented in the association, or of other representatives of such stations duly and specifically accredited to this section.

(2) Members of these two sections (and no others) shall be entitled to vote both in general sessions and in the section to which they respectively belong.

The representative appointed by the U. S. Bureau of Education shall be assigned to the section on college work and administration; the representative of the Office of Experiment Stations to the section on experiment station work; and the representative of the U. S. Department of Agriculture to either section as he may elect and the section by vote authorize; but such election once made and authorized may not be changed during the sessions of a given convention.

Each section may create such divisions as it may from time to time find desirable, and shall elect its own chairman and secretary for sectional meetings, whose names shall be reported to the association for record.

(3) Each section shall conduct its own proceedings, and shall keep a record of the same, and no action of a section, by resolution or otherwise, shall be valid until the same shall have been ratified by the association in general session and, in the case provided for in the foregoing paragraph (1), shall also have been approved by the section on college work and administration.

MEETINGS.

(1) This association shall hold at least one meeting in every calendar year, to be designated as the annual convention of the association. Special meetings may be held at other times, upon the call of the executive committee, for purposes to be specified in the call.

(2) The annual convention of the association shall comprise general sessions and meetings of the sections and provision shall be made therefor in the programme. Unless otherwise determined by vote, the association will meet in general session in the forenoons and evenings of the convention and the sections in the afternoons.

OFFICERS.

(1) The general officers of this association, to be chosen annually, shall be a president, five vice-presidents, a bibliographer, and a secretary, who shall also be treasurer; and an executive committee of five members, three of whom shall be chosen by the section on college work and administration and two by the section on experiment station work: *Provided, however,* That a member chosen by either section need not be a member of that section. The executive committee shall choose its own chairman.

(2) Each section shall, by ballot, nominate to the association in general session for its action, a chairman and a secretary for such section.

(3) The president, vice-presidents, secretary, and bibliographer of this association shall be elected by ballot upon nomination made upon the floor of the convention, and shall hold office from the close of the convention at which they are elected until their successors shall be chosen.

(4) Any person being an accredited delegate to an annual meeting of the association, or an officer of an institution which is a member of the association in full standing at the time of election, shall be eligible to office.

DUTIES OF OFFICERS.

(1) The officers of the association shall perform the duties which usually devolve upon their respective offices.

(2) The president shall deliver an address at the annual convention before the association in general session.

(3) The executive committee shall determine the time and place of the annual conventions and other meetings of the association, and shall, between such conventions and meetings, act for the association in all matters of business. It shall

issue its call for the annual conventions of the association not less than sixty days before the date on which they are to be held and, for special meetings, not less than ten days before such date. It shall be charged with the general arrangements and conduct of all meetings called by it. It shall designate the time and place of the convention; it shall present a well-prepared order of business—of subjects for discussion—and shall provide and arrange for the meetings of the several sections. The subjects provided for consideration by each section at any convention of the association shall concentrate the deliberations of the sections upon not more than two lines of discussion, which lines as far as possible shall be related. Not more than one-third of the working time of any annual convention of the association shall be confined to miscellaneous business.

FINANCES.

At every annual convention the association, in general session, shall provide for obtaining the funds necessary for its legitimate expenses, and may, by appropriate action, call for contributions upon the several institutions eligible to membership; and no institution shall be entitled to representation or participation in the benefits of the association unless such institution shall have made the designated contribution for the year previous to that in and for which such question of privilege shall arise, or shall have said payment remitted by the unanimous vote of the executive committee.

AMENDMENTS.

This constitution may be amended at any regular convention of the association by a two-thirds vote of the delegates present, if the number constitute a quorum; *Provided*, That notice of any proposed amendment, together with the full text thereof and the name of the mover, shall have been given at the next preceding annual convention, and repeated in the call for the convention. Every such proposition of amendment shall be subject to modification or amendment in the same manner as other propositions, and the final vote on the adoption or rejection shall be taken by yeas and nays of the institutions then and there represented.

RULES OF ORDER.

(1) The executive committee shall be charged with the order of business, subject to special action of the convention, and this committee may report at any time.

(2) All business or topics proposed for discussion and all resolutions submitted for consideration of the convention shall be read and then referred, without debate, to the executive committee, to be assigned positions on the programme.

(3) Speakers invited to open discussion shall be entitled to twenty minutes each.

(4) In general discussions the ten-minute rule shall be enforced.

(5) No speaker shall be recognized a second time on any one subject while any delegate who has not spoken thereon desires to do so.

(6) The hours of meeting and adjournment adopted with the general programme shall be closely observed, unless changed by a two-thirds vote of the delegates present.

(7) The presiding officer shall enforce the parliamentary rules usual in such assemblies and not inconsistent with the foregoing.

(8) Vacancies which may arise in the membership of standing committees by death, resignation, or separation from the association, of members, shall be filled by the committees, respectively.

PROCEEDINGS OF THE ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.

MINUTES OF THE GENERAL SESSION.

MORNING SESSION, TUESDAY, NOVEMBER 1, 1904.

The convention was called to order at 10 o'clock a. m., in the banquet room of the Hotel Chamberlain, at Des Moines, Iowa, President W. O. Thompson, of Ohio, in the chair.

Prayer was offered by J. Chalmers, of South Dakota.

On motion the following persons were voted the privileges of the convention under the clause of the constitution which provides that "delegates from other institutions engaged in educational or experimental work in the interest of agriculture or mechanic arts may, by a majority vote, be admitted to conventions of the association, with all privileges except the right to vote:" N. S. Mayo, Central Experiment Station, Cuba; H. Hayward, Mount Hermon Institute, Massachusetts; G. G. Hedgcock, Missouri Botanical Garden; L. W. Watkins, Michigan Board of Agriculture; W. V. Cox, secretary Government Board Louisiana Purchase Exposition.

RESOLUTION RELATING TO ASSOCIATION OF STATE UNIVERSITIES.

H. C. White, of Georgia, on behalf of the executive committee, offered the following resolution, and asked immediate action:

Resolved, That the Association of American Agricultural Colleges and Experiment Stations extend to the National Association of State Universities, now in session in this city, a most cordial greeting in recognition of common and mutual endeavors in the cause of learning, and in assurance of fraternal admiration and esteem.

Resolved, second, That members of the Association of State Universities be invited to seats on the floor during this convention.

The resolution was adopted, and the secretary was directed to transmit it at once.

REPORT OF THE EXECUTIVE COMMITTEE.

The report of the executive committee was presented by H. C. White, of Georgia, chairman, as follows:

Your executive committee, appointed at the seventeenth annual convention of the association, held in Washington, D. C., November 17-19, 1903, met immediately upon adjournment of the convention, and organized by the selection of President H. C. White, of Georgia, as chairman. Acting under instructions of the committee, the chairman issued and posted to each member of the association, under date of December 15, 1903, an abstract memorandum of the proceed-

ings of the convention of 1903. The proceedings in full were edited by the chairman, and placed in the hands of the Office of Experiment Stations, U. S. Department of Agriculture, for publication, January 10, 1904.

Six subsequent meetings of the committee, at each of which a quorum was present, were held as follows: At Washington, D. C., December 18-19, January 18-20, February 19-20, March 17-19, and October 1, and at Des Moines, Iowa, October 31. Five circulars of information concerning the results of these meetings were issued and posted to members of the association. Other business was transacted by correspondence or by attention of individual members of the committee. The call for the eighteenth annual convention (1904) was issued July 1, and the programme for the convention, as arranged by the committee, October 22.

In obedience to the instructions of the association at the last annual convention, your committee continued the efforts to secure favorable action by Congress on the mining-school bill and for increasing the annual appropriation for the experiment stations. The character and results of these efforts have been in part made known to the members of the association through the circulars issued by the committee. Meeting in Washington shortly after the convening of the second session of the Fifty-eighth Congress, in December, your committee secured the consent of Mr. Mondell, of Wyoming, to reintroduce and endeavor to secure favorable action upon the bill for the endowment of schools of mines in connection with the land-grant colleges and other institutions, which had failed of consideration in the Fifty-seventh Congress. The bill was practically identical in wording with that previously introduced by General Grosvenor, which had received the indorsement of the association. The National Association of State Universities and the National Association of State Mining Schools proposed an amendment to the bill, which your committee thought inimical to the interests of the institutions represented in this association; but after conference between your committee and the executive committees of the other associations named the amendment was abandoned, and these organizations came cordially and actively to the support of the original bill of this association. Your committee appeared before the Committee on Mines and Mining of the House of Representatives and secured a favorable unanimous report on the bill, and it was so reported to the House and placed on the Union Calendar February 1, 1904. Guided by the wise counsels of Mr. Mondell, whose efforts in behalf of the measure were most sympathetic and energetic, your committee employed its best efforts to secure consideration for the bill, but without success. Failure we believe to be attributable mainly to the shortness of the session of Congress and a disinclination to enact legislation of this character on the eve of a Presidential election, and not to opposition to the bill on its merits. Impressed with the importance of the measure to the land-grant colleges, and having faith in ultimate success in its passage, your committee earnestly recommends continued efforts of the association in this direction.

Before the meeting of your committee Mr. Adams, of Wisconsin, had introduced in the House of Representatives a bill providing for increased appropriations to the experiment stations. After conference with Mr. Adams and the suggestion of several desirable amendments, which were accepted by him, your committee gave its hearty and active support to his bill, and aided him to the extent of its ability in furthering its progress. A favorable report was secured from the Committee on Agriculture of the House in February, but it was found impossible to secure consideration for the bill before the adjournment of Congress in March. Mr. Adams was most energetic, wise, and able in the conduct of his measure, giving, indeed, the major portion of his time and attention in Congress in its interest. He has expressed his firm conviction—which your committee shares—that an overwhelming majority was favorable to the passage of his bill could consideration for it have been secured. The bill is still pending in Congress, and as its terms are in the main quite satisfactory to our institutions your committee recommends the continuance of the support of this association. The report of failure of its efforts in connection with these important measures, and of repeated failure in case of the first, is unpleasant and, to some extent, mortifying to your committee. But when it is remembered that failures many times repeated met similar efforts in connection with the Hatch Act and the act of 1890 before these were carried to final successful issue we are encouraged to believe that similar persistence in these present cases will eventually be crowned with similar success.

Immediately after the adjournment of the last annual convention your committee called upon the honorable Secretary of Agriculture, at his request, and

enjoyed a most cordial and frank conference on the subject of the cooperation between the Department of Agriculture and the agricultural experiment stations. It was known to the Secretary and to your committee that some friction had arisen in several of the States because of an overlapping of the lines of work of the Department and the stations, and the lack of cooperation and a mutual understanding necessary to preserve the interests of all concerned. It was felt that, in order that the association's standing committee on cooperation between the stations and the U. S. Department of Agriculture should be in position to advise the association from time to time, concerning the extent and character of this cooperation, a full and complete understanding between the authorities of the Department and the association should be secured. Your committee considered it within its duty to attempt to secure such understanding and a recognition of the broad and general principles which should guide such cooperation. The Secretary of Agriculture expressed his desire that conferences to that end should be freely held with the appropriate officials of the Department and designated a committee of chiefs of the bureaus of the Department, consisting of Messrs. Galloway, Whitney, and True, to confer with your executive committee with a view to arriving at a basis of cooperation mutually satisfactory. Three personal conferences of the two committees were held, characterized on the part of all concerned by cordiality, frankness, and an earnest desire to ascertain and provide for the removal of possible causes of friction in the work of the Department and of the stations. During the progress of the conferences your committee, through correspondence, solicited the views of the station workers in the several States and Territories upon the matter at issue, and a large contribution of facts and opinions in the premises is now in possession of the committee. For various reasons it has not been found possible as yet, as a result of these conferences, to reach a concrete conclusion in the matter, such, for example, as might be embodied in a code of written regulations defining the legitimate work of the Department and of the stations in common territory, but your committee is of the opinion that much has been accomplished in the direction of mutual understanding and of the establishment of a "modus vivendi" which will afford hereafter large opportunity for the association's standing committee on cooperation to advance the interest of the experiment stations through cordial and sympathetic relations with the Department of Agriculture. Your committee recommends the continuance of these conferences, understanding such to be also the pleasure of the Secretary of Agriculture.

Meanwhile, during the progress of these conferences, a rather startling incident related to the subject-matter occurred. The Committee on Agriculture of the House of Representatives, during its consideration of the agricultural appropriation act, carrying the annual appropriation to the experiment stations, inserted a clause in the act, authorizing and directing the Secretary of Agriculture to "coordinate the work of the several stations, and the work of the stations with the Department of Agriculture, to the end of preventing unnecessary duplication of work, of increasing the efficiency of the stations and the Department of Agriculture, and to unify and systematize agricultural investigation in the United States."

In the haste of disposing of necessary appropriation acts, this bill was reported and within twenty-four hours passed the House of Representatives (without a dissenting vote), and before your committee became aware of the existence of the clause referred to. Learning of its existence, your committee immediately communicated by wire with the chairman of the Senate Committee on Agriculture and received assurance that the Senate would reject or modify the clause as passed by the House. Having its own opinion of the objectionable character of the proposed legislation strengthened by numerous telegrams and letters from members of the association, your committee subsequently visited Washington and after conference with the chairmen and members of the House and Senate Committees on Agriculture, secured without difficulty a rejection of the clause by the Senate and unanimous agreement to the rejection by the conference committee of the two Houses.

This incident and the large and careful consideration given during the year to the relations of the experiment stations to the Department of Agriculture, lead your committee to report frankly to the association that, in its judgment, a grave situation has arisen, involving the entire future of agricultural research work in the United States. For many years after the establishment of the State experiment stations these were the main—almost the exclusive—

instruments through which research in agriculture in this country was prosecuted. No one conversant with the brilliant achievements of the State stations, and the beneficent influence of these upon the economic agriculture of the country, may doubt the effectiveness of the stations as agents in agricultural research. During this period the stations had a right to expect and they did receive much valuable aid from the U. S. Department of Agriculture, particularly through its ability, as a great department of the National Government, to give wide circulation to and general acquaintance with the results obtained by the stations. Within a few years past, however, a number of bureaus of purely scientific research, as related to agriculture, have arisen within the Department of Agriculture, and have been maintained by generous appropriations of money from the National Treasury. The Department has therefore entered upon—or at least been engaged in to a far greater extent than heretofore—a field of endeavor which formerly was occupied almost exclusively by the State stations.

This statement of facts is made by your committee in no spirit of complaint—certainly in no spirit of sensitiveness to rivalry. It is freely conceded that the agricultural research work of the Department of Agriculture is of high quality and value. It is as stoutly maintained that the work of the stations is at least equally so. But, with two agents operating in the same field, common prudence and regard for effectiveness dictate that care should be taken that each singly, or the two combined, should operate with maximum economy and for maximum results. Considered from the point of view of the country as a whole, and bearing in mind that the whole is but an aggregation of parts, if a particular research may, all things considered, be undertaken to the best advantage by a local station, it should be given over to the station; if by the Department, it should be given over to the Department. There would probably be no dispute of the soundness of this proposition, but there is one factor in the case which seriously disturbs the clearness of vision in discerning the relative suitabilities of the station and the Department in the premises. The Department is comparatively rich, with a readily approachable and generous Congress at its doors and the resources of the Federal Treasury at its back. The stations are comparatively poor in money, without hope, and perhaps without expectations, in equity, of large aid from their several States, widely scattered and far removed from the ear of Congressional committees. It would not be surprising, therefore, if mere possession of the financial ability to do it might lead the Department to undertake some kinds of research work which the stations are otherwise better qualified to do. There is also danger perhaps that the inability of the stations to compete with the Department in the matter of compensation offered qualified and desirable men may lower the standard or impair the enthusiasm of service at the stations in such manner as to disqualify the stations for work which otherwise, by reason of their local conditions, they should be better able to do than a single Department at the National Capital. In fine, it is conceivable that a rich and central agency of research might so overshadow poor and scattered agencies as to seriously impair their standing and efficiency. Your committee, therefore, commends to the serious consideration of the association the whole question of the relations of the State experiment stations and of the Department of Agriculture to the research work in agriculture, which must continue and increase in this country if science is to be made contributory in the fullest measure to our economic agriculture. With a view to laying in some measure a foundation for effort on the part of the association in what would seem to be an appropriate direction, and in order that a proper balance between the two great agencies of research might be preserved, your committee suggested to the chairmen of the House and Senate Committees on Agriculture, at the last session of Congress, that it might be well for the institutions represented in this association to be heard before these committees when the appropriations to the stations and to the research bureaus of the Department of Agriculture were under consideration. Both gentlemen heartily approved the suggestion, and gave it as their opinion that an expression of the views of the stations would be most acceptable and helpful to the committees. Your committee respectfully recommends that instruction be given your executive committee to make clear to the proper Congressional committees, if hearings may be secured, the important part taken by the State experiment stations in the agricultural research work of this country, with a view to securing for the stations some measure of equity in the appropriations made for this purpose from the National Treasury.

The post of Assistant Secretary of the U. S. Department of Agriculture fell

vacant through the death in July last of the Hon. J. H. Brigham. Sharing the opinion expressed in numerous communications received from members of the association, that it would be of advantage to both the Department of Agriculture and the land-grant institutions were the incumbent of this office a person of scientific attainments, personally experienced in scientific work related to agriculture, or having intelligent sympathy therewith, your committee respectfully requested of the President of the United States (in whose hands the appointment lay) an opportunity to present their views in the premises. A prompt and cordial response was made to the request, and on October 1 your committee enjoyed a personal interview of most satisfactory character with the President. Refraining, as was proper, from suggesting any individual for consideration, the views of the committee were fully presented, and emphasis was laid upon the extremely satisfactory character of the services of Professor Willits and President Dabney, incumbents of the office in previous administrations, as indicative of the type of man who might with advantage be selected at the present juncture. The President granted the committee a most kind and attentive hearing and expressed his sympathetic accord with the views presented. Your committee is abundantly satisfied that, so far as other necessary considerations will permit, the President will gladly meet the wishes of the association as expressed through your committee in making this appointment.

Numerous matters of detail, concerning which no report is necessary, have received the attention of your committee during the year. Proper representations were made as directed to the Secretary of Agriculture concerning the desire of the association that the Experiment Station Record should contain, more generally, brief extracts as well as titles of the publications of foreign agricultural experiment stations and kindred institutions, and the importance of appropriations for extending the work of the Department in the line of rural engineering.

The funds of the association have been economically administered, and the report of the treasurer will show a satisfactory balance in the treasury, with no outstanding obligations.

It is with sincere sorrow that your committee makes official record of the death on October 1, 1904, of Maj. Henry E. Alvord, one of the founders of this association, a former president and for many years the able and efficient chairman of its executive committee. The association will no doubt be moved to express in suitable manner its regret for this sad occurrence, and its appreciation of the character and services of its late honored member.

H. C. WHITE, *Chairman.*

On motion of H. P. Armsby, of Pennsylvania, the report was accepted, and the executive committee was instructed to arrange for the discussion of the subject of relations of the stations with the U. S. Department of Agriculture, raised by this report, in connection with the report on cooperation (see p. 62).

On motion of H. C. White, the request of members of the association, previously constituting the section on horticulture and botany under the old arrangement, to be allowed to form a division for horticulture and botany in one of the sections of the association, was referred to the section on experiment station work.

REPORT OF TREASURER.

The report of the treasurer was read, as follows:

Report of treasurer of the association, November 17, 1903, to October 31, 1904.

RECEIPTS.

Amount on hand November 17, 1903.....	\$263. 26
Amount received from dues.....	1, 525. 00
Amount received from National Association of State Universities for services of the joint agent of the passenger associations at Des Moines	6. 00
Total.....	1, 794. 26

EXPENDITURES.

Expenses of the executive committee-----	\$1, 123. 85
Expenses of the secretary and treasurer (postage, printing, telegrams, etc.) -----	19. 49
Services of the joint agent of the passenger associations at Des Moines-----	17. 00
Total-----	1, 160. 34
Balance on hand October 31, 1904-----	633. 92

E. B. VOORHEES, *Secretary-Treasurer.*

On motion, the report was referred to an auditing committee consisting of J. L. Hills, of Vermont, and E. A. Bryan, of Washington, which subsequently reported, as follows:

Your committee on auditing the accounts of the treasurer respectfully reports that it has surveyed the books of that office, finds them well kept, finds receipts, expenditures, and balance as stated in his report, and finds proper vouchers supporting all expenditures.

JOSEPH L. HILLS,
E. A. BRYAN,
Committee.

On motion, the report was adopted.

REPORT OF BIBLIOGRAPHER.

The report of the bibliographer, A. C. True, was presented, as follows:

During the past year the Department of Agriculture has continued the publication of the index catalogue of medical and veterinary zoology and has also issued special bibliographies of agricultural text-books, school gardens, insects, etc. The usual annual reports concerning the literature and general progress in chemistry, botany, zoology, plant diseases, veterinary medicine, and other general subjects have appeared. Among the list of bibliographies noted below there are many important ones which deal pretty thoroughly with special fields on which good bibliographies did not hitherto exist. Among these subjects we may mention the following: Molds pathogenic for animals; The function of salt in the animal organism; Sericulture; Effect of gases upon cultivated plants; Economic value of birds; Insect enemies of books; Hemorrhagic septicaemia; Plant breeding; Blood immunity and blood relationship as determined by precipitin tests for blood; Parthenogenesis; The constituents of milk; Texas fever; The feeding value of sugar-beet pulp and molasses; India rubber and gutta-percha; Roup of fowls; Avian tuberculosis; and Drinking water.

On account of the unusual interest aroused in the subject of tuberculosis as a result of Koch's theories, a great number of bibliographies relating to the different phases of this disease have been prepared and published in connection with articles containing the results of the investigations. All of the bibliographies which have just been referred to are noted more fully in the list of 68 titles which follows:

- ANDREASCH, R., and SPIRO, K. Jahresbericht über die Fortschritte der Tier-Chemie (Annual report on the progress in animal chemistry). Jahresbericht über die Fortschritte der Tier-Chemie, 32 (1902), pp. 1141. An extended review of the literature of animal chemistry for the year 1902.
- BAILEY, L. H. Development of the text-book of agriculture in North America. U. S. Department of Agriculture, Office of Experiment Stations Report 1903, pp. 689-712. A chronological bibliography of North American text-books of agriculture is appended to a discussion of this subject.
- BANKS, N. A revision of the Nearctic Chrysopidae. Transactions of the American Entomological Society, 29 (1903), No. 2, pp. 137-162. A list of 18 references to the literature of the subject is appended to the article.

- BARBACCI, O. Summarischer Bericht über die wichtigsten italienischen Arbeiten im Gebiete der allgemeinen Pathologie und pathologischen Anatomie, erschienen im Jahre 1902 (The most important Italian literature on general pathology and pathological anatomy published in 1902). *Centralblatt für Allgemeine Pathologie und Pathologische Anatomie*, 14 (1903), No. 16-17, pp. 673-709. A classified list is presented of Italian literature published in 1902 relating to technique, methods of investigation, tumors, cell structure, immunity, intoxications, infectious diseases, organic diseases, etc. A brief abstract is given of the more important works.
- BARTHELAT, G. J. Les mucorinées pathogènes et les mucormycoses chez les animaux et chez l'homme (Pathogenic molds and mucormycoses in animals and man). *Archives de Parasitologie*, 7 (1903), No. 1, pp. 5-116. A bibliography of 72 titles is given in connection with a critical review of the literature of the subject.
- BAUMGARTEN, P. von, and TANGL, F. Jahresbericht über die Fortschritte in der Lehre von den pathogenen Mikroorganismen, 1901 (Annual report on progress in the field of pathogenic micro-organisms, 1901). Leipzig: S. Hirzel, 1903, 2. Abt., pp. XII+1114. This report contains extended bibliographies relating to pathogenic bacteria, fungi, and protozoa, together with brief abstracts of the more important articles.
- BELLI, C. M. Die Ernährung ohne Salz und ihre Wirkungen auf den Organismus, speziell auf die Assimilation der Nahrungsmittel und auf den Stickstoffwechsel des Menschen (Diet without salt and its effect upon the body, especially upon the assimilation of food and the metabolism of nitrogen in man). *Zeitschrift für Biologie*, 45 (1903), No. 2, pp. 182-222. A list of 21 references to the literature of the subject is appended to the article.
- BISSEX, E. Elenco di pubblicazioni attinenti alla bachicoltura, che vennero fuori nel corso del 1902 e 1903 (List of publications relating to sericulture issued during the years 1902 and 1903). *Annuario della R. Stazione Baccologica di Padova*, 31 (1903), pp. 119-139. A list is given of books and periodical articles on the various lines related to sericulture as published in different languages during 1902 and 1903.
- BONGERT, J. Beiträge zur Biologie des Milzbrandbacillus und sein Nachweis im Kadaver der grossen Haustiere (Biology of the anthrax bacillus and its demonstration in the carcasses of the larger domesticated animals). *Centralblatt für Bakteriologie, Parasitenkunde, und Infektionskrankheiten*, 1. Abt., 35 (1903), No. 2, Orig., pp. 198-201. A list of 77 references to the literature of this subject is given.
- BRIZI, U. Sulle alterazioni prodotte alle piante coltivate dalle principali emanazioni gassose degli stabilimenti industriali (The effect of gases and fumes upon cultivated plants). *Le Stazioni Sperimentali Agrarie Italiane*, 36 (1903), No. 4-5, pp. 279-384. A bibliography of 101 titles is appended to the paper.
- CHAPMAN, F. M. The economic value of birds to the State. Albany: New York State Forest, Fish, and Game Commission, 1903, pp. 66. A brief bibliography of articles relating to the food of American birds is appended.
- CORRENS, C. Neue Untersuchungen auf dem Gebiet der Bastardirungslehre (Recent investigations in plant hybridization). *Botanische Zeitung*, 61 (1903), No. 8, pp. 114-126. A list of 22 references to the literature of the subject is appended to the article.
- COULTER, J. M., and CHAMBERLAIN, C. J. Morphology of angiosperms. New York: D. Appleton & Co., 1903, pp. X+348. The bibliographies, which are an important feature of the work, are arranged chronologically at the end of each chapter, and all the citations are brought together at the close of the volume, the arrangement being alphabetical by authors.
- CROSBY, D. J. A few good books and bulletins on nature study, school gardening, and elementary agriculture for common schools. U. S. Department of Agriculture, Office of Experiment Stations Circular 52, pp. 4.
- DANDENO, J. B. The effects of water and aqueous solutions on foliage leaves. *Transactions of the Canadian Institute*, 7 (1902), 11, No. 14, pp. 237-350. A bibliography of this subject is appended to the article and appears on pages 346-350. It includes 107 titles.
- DYÉ, L. Sur les culicides (Observations on the Culicidae). *Archives de Parasitologie*, 6 (1902), No. 3, pp. 359-376. The literature of the subject is reviewed in connection with a brief bibliography.
- ENRIGUEZ, E., and SICARD, J. A. Les oxydations de l'organisme (Oxidations in the animal organism). Paris: J. B. Baillière & Sons, 1902, pp. 87. A bibliography of the subject is appended.

- FRUWIRTH, C. Referate über neuere Arbeiten auf dem Gebiete der Pflanzenzüchtung (References to recent work in plant breeding). Journal für Landwirtschaft, 51 (1903), Nos. 2, pp. 223-230; 4, pp. 371-387. References are given to 48 recent articles on plant breeding, with a brief abstract of the article in each case.
- GREINER, T. The new onion culture. New York: Orange Judd Co., 1903, rev. and enl. ed., pp. 112. A list of station and Department publications on onion culture is appended.
- GUILLEREY, J. Ueber den epizootischen Abortus der Stuten (Epizootic abortion in mares). Archiv für Wissenschaftliche und Praktische Thierheilkunde, 29 (1903), No. 1-2, pp. 37-68. The literature of this subject is critically discussed in connection with a bibliography of 32 titles.
- HEMENWAY, H. D. List of articles published on school gardens. Transactions of the Massachusetts Horticultural Society, 1902, II, pp. 249-254. The list includes 65 articles.
- HERRERA, A. L. Bibliografía relativa á los insectos que destruyen las cortezas (A bibliography relating to insects injurious to bark). Boletín de la Comisión de Parasitología Agrícola, 2 (1903), No. 3, pp. 104-114. A list of articles largely compiled from publications of this Department.
- HILGER, A., and DIETRICH, T., ET AL. Jahresbericht über die Fortschritte auf dem Gesamtgebiete der Agrikultur-Chemie, 1902 (Annual report of the progress in agricultural chemistry, 1902). Berlin: Paul Parey, 1903, pp. XXXVI + 580.
- HOFFMANN, A. Untersuchungen über den Einfluss der Hetolbehandlung auf die Impftuberculose der Meerschweinchen und der Kaninchen (The effect of treatment with hetol upon inoculation tuberculosis of guinea pigs and rabbits). Archiv für Wissenschaftliche und Praktische Thierheilkunde, 30 (1904), No. 1-2, pp. 162-187. A list of 37 references to the literature of the subject is appended to the article.
- HOULBERT, C. Les insectes ennemis des livres (Insect enemies of books). Paris: Alphonse Picard & Sons, 1903, pp. XXXVIII + 269. A list of 94 references to the literature of this subject is given.
- ISTVÁNYFI, G. DE. Études sur le rot livide de la vigne (Studies on the white rot of grapes). Annales de l'Institut Central Ampélogique Royal Hongrois, 2 (1902), pp. 288. Numerous footnote references are given, which constitute a very extensive bibliography of the literature of the subjects treated.
- KELLERMAN, W. A. Index to North American mycology. Journal of Mycology, 10 (1904), Nos. 71, pp. 116-143; 72, pp. 182-194; 73, pp. 251-283. An alphabetical list of articles, authors, subjects, new species and hosts, new names and synonyms is given in each number of this journal.
- KIRSTEN. Die Varietäten des *Bacillus oedematis maligni* (The varieties of *Bacillus oedematis maligni*). Archiv für Wissenschaftliche und Praktische Thierheilkunde, 30 (1904), No. 3, pp. 223-260. A critical review of the literature of this subject with an extensive bibliography.
- KLEPTZOV, K. Z. K voprosu o passivnom immunitete pri gemorragicheskikh septitseniyakh (Passive immunity in various forms of hemorrhagic septicemia). Archiv Veterinarnykh Nauk, St. Petersburg, 33 (1903), Nos. 6, pp. 553-581; 7, pp. 685-700; 8, pp. 781-815. The literature relating to swine plague, hemorrhagic septicemia in cattle, and other related diseases is critically discussed, in connection with a bibliography including 67 titles.
- KLÖCKER, A. Translated by G. E. Allan and J. H. Millar. Fermentation organisms. New York: Longmans, Green & Co., 1903, pp. XX + 392. A bibliography of the more important works relating to this subject is given on pages 347-381.
- KOSSEL, H., ET AL. Vergleichende Untersuchungen über Tuberkelbazillen verschiedener Herkunft (Comparative investigations on tubercle bacilli of different origin). Tuberkulose-Arbeiten aus dem Kaiserlichen Gesundheitsamte, 1904, No. 1, pp. 1-82. This article contains a bibliography of 194 titles.
- KROMPECHER, E., and ZIMMERMANN, K. Untersuchungen über die Virulenz der aus verschiedenen tuberkulösen Herden des Menschen reingezüchteten Tuberkelbacillen (The virulence of tubercle bacilli in pure cultures from tuberculous foci in man). Centralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten, 1. Abt., 33 (1903), No. 8, Orig., pp. 580-607. A list of 18 references to the literature of the subject is appended to the article.

- LAVINOVICH, M. Popuitka lyecheniya sapa i immunizatsii protiv nego y koshek i morskikh svinov (Experiments in the treatment of glanders and immunization of cats and guinea pigs against this disease). *Archiv Veterinarnykh Nauk*, St. Petersburg, 33 (1903), No. 3, pp. 211-226. A list of 34 references to the literature of the subject is given.
- MACDOUGAL, D. T. The influence of light and darkness upon growth and development. *Memoirs of the New York Botanical Garden*, 2 (1903), pp. XIII+319. The footnotes include over 200 references to the literature of the subject.
- MARCHAL, E. Revue des travaux de pathologie végétale, 1902 (Review of work on vegetable pathology, 1902). *Bulletin Cercle d'Études des Agronomes de l'État* [Brussels], 1903, No. 8, pp. 379-389. A review of the literature of this subject, to which a list of 49 references is appended.
- MERRILL, E. D. Botanical work in the Philippines. *Philippine Bureau of Agriculture Bulletin* 4, pp. 53. A list of the more important books relating to this subject is appended.
- MICHAEL, A. D. *British Tyroglyphidae*. London: Ray Society, 1903, vol. 2, pp. VII+183. A list of the principal books and papers giving information relative to the Tyroglyphidae.
- MONFALET, D. *Bibliographie abrégée des infections* (Abridged bibliography of infectious diseases). Paris and Santiago: C. Goffi, 1903, pp. 65. In this bibliography the author's purpose was to present for the practical investigator and student a list of the most important publications relating to the various infectious diseases of animals and man. The number of diseases on which bibliographies are presented is about 90.
- NASMITH, G. G. The chemistry of wheat gluten. *Transactions of the Canadian Institute*, 7 (1903); *University of Toronto Studies, Physiological Series*, 1903, No. 4, pp. 22. A list of 35 references to the literature of the subject is appended.
- NUTTALL, G. H. F. Blood immunity and blood relationship, a demonstration of certain blood relationships amongst animals by means of precipitin tests for blood. Cambridge: University Press, 1904, pp. XII+444. The literature relating to serum constituents and immunity is critically discussed in connection with an extensive bibliography.
- OTTAVI, E., and MARESCALCHI, A. *Bibliographia agronomica universalis*. Casale: Ottavi Bros., 1903, Nos. 2, pp. 57-128; 3, pp. 129-176; 4, pp. 177-263. This is a continuation of the general agricultural bibliography noted in the previous report. The number of articles noted has reached 2,094. Articles in Italian, French, German, and English are included.
- PANOV, N. O bugorchatkye vuziuvaimoi u zhivotnykh mertvuimi tuberkulez-nymi batzillami (Tuberculosis caused by dead tubercle bacilli). Dissertation, Yuriev, 1902, pp. 134. The literature of this subject is critically reviewed in connection with a bibliography of 101 titles.
- PEIRCE, G. J. A text-book of plant physiology. New York: Henry Holt & Co., 1903, pp. VI+291. References to literature given in footnotes serve as a considerable bibliography of the subjects treated.
- PHILLIPS, E. F. A review of parthenogenesis. *Proceedings of the American Philosophical Society*, 42 (1903), No. 174, pp. 275-345. A critical review is given of the literature of this subject in connection with an extensive list of references.
- PHILLIPS, W. F. R. Recent papers bearing on meteorology. U. S. Department of Agriculture, Weather Bureau, *Monthly Weather Review*, 31 (1903), pp. 334, 373, 413, 473, 521, 569.
- PREISZ, H. Studien über Morphologie und Biologie des Milzbrandbacillus (The morphology and biology of anthrax bacillus). *Centralblatt für Bakteriologie, Parasitenkunde, und Infektionskrankheiten*, 1. Abt., 35 (1904), No. 6, Orig., pp. 660-661. A list of 23 references to the literature of this subject.
- PRESCOTT, S. C., and WINSLOW, C. E. A. *Elements of water bacteriology*. New York: John Wiley & Sons; London: Chapman & Hall, Ltd., 1904, pp. X+162. A list of 180 references to the literature of the subject is given.
- RABINOWITSCH, LYDIA, and KEMPNER, W. Die Trypanosomen in der Menschen- und Tierpathologie, sowie vergleichende Trypanosomenuntersuchungen (Trypanosomata in human and animal pathology). *Centralblatt für Bakteriologie, Parasitenkunde, und Infektionskrankheiten*, 1. Abt., 34 (1903), No. 8, Originale, pp. 804-822. The literature relating to trypanosomata is critically reviewed in connection with a bibliography of literature published during the years 1898-1903. The references given number 150.

- RAUDNITZ, R. W. Bestandteile, Eigenschaften und Veränderungen der Milch (The constituents of milk—their properties and changes). *Ergebnisse der Physiologie*, 2 (1903), pp. 193–325. This is a general review of the literature of this subject, the bibliography including about 679 references.
- REGN. H. Der Bakteriengehalt des von Rauschbrand befallenen Muskelgewebes und der Rauschbrandimpfstoffe (The bacterial content of muscle tissue affected with blackleg and of blackleg vaccine). *Archiv für Wissenschaftliche und Praktische Tierheilkunde*, 30 (1904), No. 3, pp. 261–280. A brief bibliography of the subject is appended to the article.
- SCHMIDT, A. Die Zeckenkrankheit der Rinder—Hämoglobinämia ixodioplasmatosa boum—in Deutsch-, English-Ostafrika und Uganda (The tick disease of cattle (Hämoglobinämia ixodioplasmatosa boum) in German and English East Africa and Uganda). *Archiv für Wissenschaftliche und Praktische Tierheilkunde*, 30 (1904), No. 1–2, pp. 42–101. The literature of this subject is discussed with reference to a bibliography of 221 titles.
- SCHMOEGER, M. Presslinge, Diffusionsschnitzel, Melasse (Beet diffusion residue and molasses). *Die Landwirtschaftlichen Versuchs-Stationen*, 59 (1903), No. 1–2, pp. 83–155. Numerous references to the literature of the subject are given in footnotes.
- SEELIGMANN, T., TORRILHON, G. L., and FALCONNET, H. Translated by J. G. McIntosh. India rubber and gutta-percha. London: Scott, Greenwood & Co., 1903, pp. XI+402. A bibliography of 404 references to the literature of the subject is given on pages 385–396.
- SERGEANT, E. La lutte contre les moustiques (The warfare against mosquitos). Paris: J. Rueff, 1903, pp. 96. The literature relating to methods for exterminating mosquitoes is discussed, and a list of 110 references given.
- STILES, C. W., and HASSALL, A. Index-catalogue of medical and veterinary zoology. U. S. Department of Agriculture, Bureau of Animal Industry Bulletin 39, part 6, pp. 437–510. This part of the bulletin includes authors whose names begin with the letter F.
- STREIT, H. Untersuchungen über die Geflügeldiphtherie (Fowl diphtheria). *Zeitschrift für Hygiene und Infektionskrankheiten*, 46 (1904), No. 3, pp. 407–462. A list of 46 references to the literature of the subject is appended to the article.
- STUTZER, A. Die Behandlung und Anwendung des Stalldüngers (The management and use of barnyard manure). Berlin: Paul Parey, 1903, 2. ed. enl., pp. VIII+168. A list of 102 references to the literature of the subject is given.
- SWITHINBANK, H., and NEWMAN, G. Bacteriology of milk. London: John Murray, 1903, pp. XX+605. Numerous references to the literature of this subject are given in footnotes.
- TENNERT. Ueber *Trichorrhexis nodosa* mit spezieller Berücksichtigung der Ätiologie und Therapie (*Trichorrhexis nodosa*, with special regard to its etiology and treatment). *Zeitschrift für Veterinärkunde*, 14 (1902), No. 8–9, pp. 361–372. A brief bibliography is appended to the article.
- THIELE, R. General-Register der Hygienischen Rundschau. Band I–X, 1891–1900 (Index to Hygienische Rundschau, volumes 1–10, 1891–1900). Berlin: August Hirschwald, 1904, pp. 432.
- TRINK- UND GEBRAUCHSWASSER (Water used for drinking and similar purposes). *Zeitschrift für Untersuchung der Nahrungs- und Genussmittel*, 6 (1903), No. 22, pp. 1040–1059. Brief abstracts of and references to 60 recent articles relating to this subject.
- VANDEVELDE, A. J. J. Répertoire des travaux publiés sur la composition, l'analyse et les falsifications des denrées alimentaires pendant l'année 1902 (Review of the literature of composition, analysis, and adulteration of foods for the year 1902). Separate from Bulletin du Service de surveillance de la Fabrication et du Commerce des Denrées Alimentaires, 1903, pp. 95. This contains 691 references and is the third volume on this subject.
- VIALA, P., and RAVAZ, L. American vines: their adaptation, culture, grafting, and propagation. San Francisco: California Wine Assoc., 1903, pp. 299. A bibliography of the writings of 72 authors is contained in the appendix.
- VINCENT, J. Notes bibliographiques sur les nuages—classification et nomenclature (Bibliographic notes on clouds—classification and nomenclature). *Annuaire météorologique pour 1903*. Brussels: Observatoire Royal de Belgique, 1903, pp. 430–449.
- WATERHOUSE, F. H. Catalogue of the library of the Zoological Society of London. London: Taylor and Francis, 1902, 5. ed., pp. 856. Titles are given of about 11,000 works in the library of the Zoological Society, together with a list of periodicals received.

- WEBER, A., and BOFINGER, H. Die Hühnertuberkulose (Avian tuberculosis). Tuberkulose-Arbeiten aus dem Kaiserlichen Gesundheitsamte, 1904, No. 1, pp. 83-158. A bibliography of 183 titles is appended to this article.
- WEIGMANN, HÖFT, and GRUBER. Fortschritte auf dem Gebiete der Chemie, Hygiene, und Bakteriologie der Milch und ihrer Erzeugnisse (Progress in the field of the chemistry, hygiene, and bacteriology of milk and its products). Chemiker Zeitung, 28 (1904), No. 19, pp. 223-232. A summary of the literature during 1903, 128 references being given in footnotes.
- ZEILL, A. Die Carpalbeule des Rindes und ihre Behandlung (Bursal enlargements upon the carpus of cattle and their treatment). Archiv für Wissenschaftliche und Praktische Tierheilkunde, 29 (1903), No. 5, pp. 445-475. A critical discussion of the literature of this subject, with a bibliography of 81 titles.

The report was accepted.

COLLECTIVE COLLEGE AND STATION EXHIBIT AT ST. LOUIS.

W. H. Jordan, chairman, submitted the following report of the committee in charge of the collective exhibit of the Association of American Agricultural Colleges and Experiment Stations at the Louisiana Purchase Exposition:

Your committee deems it expedient at this time to make only a comparatively brief report of the results of its labors. It is impossible to present now a complete and final report of the exhibit under our charge. As the exhibit is certainly worthy of an extended report commensurate with the extent and dignity of the display which has been made of the work of the institutions represented, we feel that its preparation must be delayed until the final completion of all matters coming under our jurisdiction. Our purpose, therefore, at this time, is simply to lay before you a few general facts summarizing the results of the effort which you placed in our hands.

In the first place, the committee desires to express its gratification at the outcome of the decision to locate the main portion of this exhibit as a unit in the Palace of Education. Considerable pressure was brought to bear upon us in favor of locating the agricultural part of the exhibit in the Agricultural Building, but your committee was unanimously of the opinion that there is no good reason why agricultural education should maintain its class relations any more than instruction in the principles of steam or electrical engineering. Previous exposition displays of the work of the agricultural departments of the colleges and of the agricultural experiment stations have been located in the Agricultural Building, and so, for the first time, the work of these institutions has taken its rightful place among the great educational efforts of our nation, and in this way has secured a recognition that otherwise would not have been possible.

There is one feature of this exhibit which we believe to be worthy of comment. It was not a "show" exhibit. Mere beauty or novelty of display was not the main object sought. While every reasonable effort was put forth to make it attractive in its design, arrangement, and coloring, the materials which were selected for display were those which are in actual use for the purposes of instruction in the various departments of our land-grant colleges, or those which represent with as much realism as possible the actual practical results of research. We are glad to have been assured that the exhibit was found profitable for study on the part of the real seekers after information, and that it impressed itself upon intelligent observers as a worthy and consistent exposition of certain features of education and research in the relations of science to agriculture and the mechanic arts.

INSTALLATION AND MAINTENANCE OF EXHIBIT.

The exhibit in the Palace of Education has been installed practically in accordance with the plan presented to the association in the report of your committee at the meeting of this association in 1903. Fifty-one institutions are represented. In the preparation of the various sections 24 experts generously assisted, who discharged their duties in a manner highly satisfactory to the committee. The explanation of the Palace of Education exhibit to the visiting public has been accomplished by the use of expert demonstrators, generally students or graduates of some land-grant college, 8 being on duty at one time.

The number of persons appointed to positions of one kind or another in connection with the exhibit as a whole and paid from the appropriation, either for services or traveling expenses, has been 230, divided as follows:

Members of the committee.....	9
Experts in charge of sections.....	24
Expert demonstrators, inside exhibit.....	26
Experts connected with outside exhibit.....	17
Lecturers connected with outside exhibit.....	31
Students used in outside exhibit demonstration.....	50
Officers of administration, clerks, stenographers, janitors, guards, etc.....	73
Total	230

This seems to be a large force, but is really the smallest number with which it has been feasible to install and maintain the exhibit as a real and live demonstration of our work. Your committee has used every reasonable effort to hold the expenses for such services to the lowest possible practicable point. It should be noted that when any expenditure was involved, no matter how brief the service, even if but for a day, an appointment by the Government board has been necessary, so that the number of appointments is more formidable than the actual expense connected therewith.

EXPENDITURES.

The financial situation is gratifying. Up to October 24 the expenditures were approximately the following:

Preparation and collection of exhibit.....	\$19,527.48
Installation	27,439.05
Maintenance	8,650.75
Administration	15,388.01
Total	71,005.29

It is clear that the expenditures for the exhibit will come well within the appropriation. In fact, it now seems likely that there will be an unexpended balance, a result neither anticipated nor desired by your committee. This is to some extent due to the fact that the expenditures for the outside exhibit in plant breeding and animal husbandry were less than was planned. Difficulties which need not be mentioned in this connection, and for which your committee does not hold itself responsible, were encountered in arranging for the outside exhibit, and it was only by the most strenuous efforts that this portion of our display was finally accomplished, and as a general result the demonstration work of this division was necessarily abridged, the first period of two weeks, or one-third the whole time planned, being necessarily omitted entirely.

THE OUTSIDE EXHIBIT.

The outside exhibit, as stated, was accomplished only after overcoming serious difficulties; nevertheless it should be regarded as a useful and important feature. It covered demonstration work in plant breeding, corn judging, stock judging, and slaughter tests displaying the results of experiments in the feeding of animals. These demonstrations occupied two periods, the first extending from September 11 to September 24, inclusive, and the second from October 3 to October 16, inclusive. Approximately 50 lectures were given during these periods by specialists on topics directly related to the subjects above mentioned, and in displaying methods of instruction 50 students collected from various institutions were in attendance on the exhibit from time to time.

RECOGNITION OF EXHIBIT.

It is not too much to claim that this exhibit in all its divisions has been fairly successful. This is evident both from the remarks which have been made concerning it by competent judges as well as from the awards granted by the sev-

eral juries. These awards, exclusive of those granted to collaborators, are as follows:

Grand prizes -----	24
Gold medals -----	41
Silver medals -----	35
Bronze medals -----	35
Total -----	135

EXPLOITATION OF THE WORK OF THE COLLEGES AND STATIONS.

At the last meeting of your committee, held on June 27, 1904, a somewhat unusual plan was adopted, but it is hoped an efficient and useful one, for exploiting the work of the institutions represented in this exhibit. At that time arrangements were perfected with a magazine writer of recognized ability to present various phases of our work in some of the leading magazines of this and other countries, the exhibit itself being made the occasion of these articles and the center around which they are to be grouped. While none of these articles have as yet appeared, they are in the process of preparation; and arrangements are definitely made with leading magazines for the publishing of a portion of them. It is hoped that in this way we may be able to reach that part of the intelligent public, which now knows very little about our work, with dignified and interesting discussions of what we are now doing and of the bearing of our educational and research efforts upon the social and economic interests of this country.

THE DISPOSAL OF THE EXHIBIT.

The next important question to be considered is what shall be the fate of this exhibit which has cost so much effort and money. There seems to be a desire on the part of some that it shall somehow be preserved in a permanent form to be enlarged and improved as time and occasion permit. It is also suggested that it be preserved for utilization at other expositions in this and foreign countries. The various articles may also be returned, with the consent of the Government board, to the institutions furnishing or preparing them. The final disposal of the exhibit is a matter which your committee will have to consider at no very distant date, concerning which we desire your advice and, if necessary, your instructions.

ACKNOWLEDGMENTS.

Your committee deems it a pleasure to record in this connection its hearty appreciation of the pleasant relations which have existed between it and the Government board from the beginning of our official connection. Throughout all this time this board has given to your committee the most prompt and efficient support. The thanks of the association are due to the honorable Secretary of Agriculture and to the Office of Experiment Stations under his charge for indispensable aid in organizing the exhibit in many of its details. We are also under deep obligations to the officials of the Exposition, especially to Mr. H. J. Rogers, chief of the Palace of Education, for the facilities which have been placed at our disposal and for the uniform courtesy with which we have been treated. The loyal support of the institutions represented in this association has been a main factor in the success of our exhibit, and we desire to especially recognize the aid of those institutions which have so generously donated the time and services of men and which have contributed to the preparation of materials for display. Without such support from certain colleges and stations your committee would have been unable to perform the duties devolving upon it. Your committee deems it a pleasure to recognize in this public way the able services of Mr. James L. Farmer, chief special agent of the Government board, who has managed the business affairs of the exhibit with singular tact and efficiency.

W. H. JORDAN,
For the Committee.

On motion the report was accepted, and the committee was authorized to take steps, under regulations established by the Government board, to close up and dispose of the exhibit.

COMMUNICATION FROM NATIONAL ASSOCIATION OF STATE UNIVERSITIES.

The chairman of the executive committee read the following communication from the National Association of State Universities:

The National Association of State Universities in annual meeting assembled sends fraternal greetings to the Association of American Agricultural Colleges and Experiment Stations, and begs to express its friendly sentiment and its cordial good wishes for a pleasant and profitable session, and to venture the hope that these two associations through their annual meetings may be greatly instrumental in promoting the cause of the highest and the higher liberal professional and technical education in the United States.

G. E. MACLEAN, *President*.

GEORGE E. FELLOWS, *Secretary*.

UNIFORM FERTILIZER AND FEEDING STUFF LEGISLATION.

H. J. Wheeler, chairman, presented the following report of the committee on this subject:

In the course of the past year your committee, as heretofore, has been in correspondence with parties in several States who were interested in the passage of new fertilizer laws or in the amendment of existing ones.

Arizona, Idaho, New Mexico, Nevada, Montana, Wyoming, and Utah have not yet felt the necessity of legislation in this line. In Colorado and Arkansas recent attempts to pass such laws have been defeated. The following reports have been received from some of the other States:

Ex-Director Huston, of Indiana, reports that the existence of the recommendations of this association was of much assistance in connection with steps taken to amend the old fertilizer law in that State. The law as enacted was made to correspond to the recommendations in certain particulars, and the other points were practically all left to the discretion of the executive officer, thus rendering it possible to make rules in accordance with the recommendations.

Professor Ladd, of North Dakota, reports that at the last session of the legislature in that State a fertilizer law was enacted and that the bill was drawn in accordance with the recommendations of this association, which, he says, were very helpful in the preparation of the bill "and in securing the necessary legislative action thereon."

R. E. Rose, State chemist, Tallahassee, Fla., writes that the law in that State has recently been amended to conform, in so far as possible, with the recommendations concerning uniformity. He adds that the recommendations were of material service.

Prof. F. B. Mumford, of Missouri, reports that the law in that State has been amended recently and that the recommendations were of "much assistance."

President McBryde, of Virginia, reported, July 4, 1903, that changes in the law in that State were then being considered and that amendments in the line of the recommendations were being urged. In conclusion he says: "It follows, therefore, that your recommendations will be helpful in securing the legislation needed."

Director Armsby reports that the recently amended law of Pennsylvania conforms very largely in substance to the recommendations.

Director Soule, of Tennessee, states that a new law was passed in that State in April, 1903. The law was drawn with the object of making it conform with the recommendations of the associations, but a few amendments were made not in harmony therewith which it is believed weakened the law. He adds that it is hoped later to secure such amendments as will make the law conform to the original draft, and that "had it not been for the existence of the recommendations it would probably not have been possible to secure the passage of the present law."

Director J. F. Dugger, of Alabama, writes, under date of July 7, that in that State "the old law has been replaced this year by a new one which embodies the recommendations of the Association of American Agricultural Colleges and Experiment Stations and of the Association of Official Agricultural Chemists," and that "the recommendations alluded to have had much weight in securing the revision of legislation along this line."

After careful consideration of the subject your committee submits the following recommendations regarding laws regulating the sale of feeding stuffs:

(1) That for the purpose of defraying the expenses of feeding-stuff inspection the State should preferably make a direct appropriation.

(2) That the following materials should be exempt from the provisions of feeding-stuff laws: Hays and straws and whole unmixed seeds, such as wheat, rye, barley, oats, Indian corn, buckwheat, broom corn, peas, and the unmixed meals of the entire grains of such seeds.

(3) The term "concentrated feeding stuff" should include linseed meals, cotton-seed meals, cotton-seed feeds, pea meals, coconut meals, gluten meals, gluten feeds, maize feeds, starch feeds, sugar feeds, dried brewers' grains, dried distillers' grains, malt sprouts, hominy feeds, cerealine feeds, germ feeds, rice meals, oat feeds, corn and oat chops, corn and oat feeds, corn bran, ground beef or fish scraps, condimental foods, poultry foods, stock foods, patented proprietary or trade-marked stock and poultry foods, and all other materials of a similar nature not included in section 2 above. Where practicable the by-products from the milling of wheat, rye, and buckwheat should be included under the requirements of the laws.

(4) That a legible printed statement should be affixed to or printed on each package containing a feeding stuff named in section 3, giving the net weight of the package, the name and address of the manufacturer or importer, the name, brand, or trade-mark under which the article is sold, and the guaranteed analysis showing the percentage of crude protein and of crude fat and a maximum of fiber which shall not be exceeded.

The law should provide that the chemical analysis, including determinations of crude fiber, crude protein, and crude fat, shall be made by the official methods of the Association of Official Agricultural Chemists.

If the feeding stuff is sold in bulk or put up in packages belonging to the purchaser, the agent or dealer shall furnish him with a certified statement of the net weight of the lot, the name and address of the manufacturer or importer, the brand or trade-mark under which said article was sold, and the percentage of crude protein and crude fat which said article is guaranteed to contain as determined by the official methods of the Association of Official Agricultural Chemists.

(5) That a certified copy of the statement in section 4, above, be filed with the executive officer each year.

(6) That the law should contain a penalty, by fines only, for violations of its provisions.

The committee recommends to the Association of American Agricultural Colleges and Experiment Stations the adoption of the recommendations 1 to 6, inclusive, with the suggestion that this or some other committee should be instructed to use its efforts to secure the end in view by using its influence to aid in securing uniform legislation in the several States.

H. J. WHEELER,
CHAS. D. WOODS,
E. H. JENKINS,
H. P. ARMSBY,
M. A. SCOVELL,
Committee.

H. J. WHEELER, of Rhode Island. At the meeting last year your committee made certain recommendations in regard to feeding-stuff laws in the United States. This recommendation went to the section on agriculture and chemistry, and was referred to the general session, and owing to objections which were made to one clause it was referred again to your committee. The committee begs leave to report the recommendations made last year with the modification of section 1. Section 1 read last year: "That for the purpose of defraying the expenses of feeding-stuff inspection the State should make a direct appropriation, or where this is impracticable a brand tax should be levied. In view of the experience of Maine and Vermont a tonnage tax is not to be recommended."

Your committee now recommends that this read as follows: "That for the purpose of defraying the expenses of feeding-stuff inspection the State should preferably make a direct appropriation." In other respects the recommendations stand exactly as they did last year.

One other matter was referred to your committee, a communication received from Doctor Hopkins, of Illinois, which I believe was presented to the section

on agriculture and chemistry: "Shall we say ammonia or nitrogen, phosphoric acid or phosphorus, potash or potassium?"

Your committee held a meeting in March, 1904, in New York, at which various matters were under consideration, and at that time it was deemed by the committee inadvisable, in view of the fact that a large number of the States had passed laws using the terms phosphoric acid and potash, to go back and undo all that work and change to potassium and phosphorus.

C. G. HOPKINS, of Illinois. This matter of the terms to be used in connection with fertilizers, as well as in stating analyses of other matters, as soils and ash, is now also being considered by the Association of Official Agricultural Chemists, having been taken up by that association at the St. Louis meeting. A committee has been appointed by that association to consider the entire question of nomenclature of such materials as require chemical analysis and statement of the constituents found, and I should be sorry to see final action taken by this association at this time. It seems to me it would be well to appoint a committee to act jointly with the committee from that association to bring in a joint report at our next annual meeting, rather than to take any final action at this time. I think our first duty as an association is to the American farmer. The thing which will ultimately be of the greatest benefit to the American agriculturist is the thing we should do. I realize we have considerable literature pertaining to soils and fertilizers in America, and that we have quite a diversified system of naming the three principal constituents of fertilizers. In the literature in perhaps one-third of the States they say ammonia, and in two-thirds of the States they now say nitrogen, under State laws. In nearly all the State literature we see phosphoric acid when phosphorus pentoxid is meant, although in any of the other sciences—such as pharmacy and medicine—when they say phosphoric acid they mean that. The literature which comes from the U. S. Department of Agriculture says potassium, and not potash, and it says PO_4 instead of P_2O_5 , so there is by no means perfect harmony in the conditions we now have. It has seemed to me the longer I have studied the question of soils and fertilizers the more necessary it is that we simplify this unnecessarily complicated situation. I suppose many of you have tried to explain to the practical common-sense farmer why it is we pay for potash (K_2O) when we buy potassium as chlorid (KCl). That is, we value potassium chlorid on the basis of potassium oxid, although there is no potassium oxid in potassium chlorid. In my own experience I have found that the situation becomes ridiculous to the common-sense farmer, and scientists are responsible for it. We persist because it would require a little extra clerical work to go over our records and make some changes. Surely we must do the thing which is simplest for the practical man. American agriculture is going to advance as the farmer understands the business.

H. J. WHEELER. I wish to say that the committee is in most hearty accord with Doctor Hopkins in his idea of simplifying matters. But this association and the association of chemists made certain recommendations a number of years ago and both have been working hand in hand to secure the adoption of laws in the various States in accordance with a certain line of uniformity, and many of the States of the Union have already, after long effort, been persuaded to change their laws in accordance with those recommendations. To make any change to-day would mean to undo all we have done in the last eight or ten years. It is quite another proposition to take up the matter of nomenclature in regard to ordinary station work. I therefore move that the matter of the nomenclature used in the reporting of experiment station work be referred to the section on experiment station work for their consideration.

The motion was carried. (See p. 117.)

METHODS OF SEED TESTING.

E. H. Jenkins, chairman of the standing committee on seed testing, submitted the following report:

Since the last meeting of the association the committee has submitted its revision of the rules for seed testing to a number of those interested in the work for further suggestions, and the final revision of the work has been printed and distributed by the Office of Experiment Stations as Circular No. 34, revised, pp. 24, with the title—Rules and Apparatus for Seed Testing. It is the hope of the committee that the methods prescribed will commend themselves to those who are engaged in seed testing and be adopted by them.

The committee will gratefully receive any criticism of the methods or suggestions for their improvement.

All of which is respectfully submitted.

E. H. JENKINS, *Chairman*.
F. W. CARD.
W. R. LAZENBY.
E. BROWN.
A. D. SHAMEL.

The report was accepted.

MILITARY INSTRUCTION.

The following report was received from the chairman of the committee on this subject through the chairman of the executive committee:

Several matters of special interest to all the institutions were referred to this committee by the convention at its last annual meeting, but as they appear upon the printed programme it is unnecessary to repeat them here. They involve matters of the very highest importance to all the colleges in the association, and I may be permitted at the outset to express my deep regret that I am compelled to make only a brief and incomplete report. During all the early part of the year the condition of my health was such as to keep me under a physician's care for several months; during which time I was able to perform only a small part of my own regular duties, and the only outside matters to which I gave the slightest attention were in connection with meetings of the executive committee of this association. This word of explanation is due to my associates as well as to myself, and I hope the personal allusion may be pardoned. In any case, it is difficult to secure meetings of a committee the members of which are so widely scattered, and especially when those meetings, in order to be productive of permanent results, must be made to coincide with the convenience of officials in one of the great departments of the Government. Such a meeting, in order to avoid waste of time, should have before it some definitely considered body of proposals which had been previously submitted to all the members and which might thus form the basis of definite action to be proposed to the department concerned. Owing to my inability to give sufficient consideration to the important questions involved to justify me in trying to formulate such proposals for the committee no meeting has been called during the year, but I beg to suggest that even this, unfortunate as it seems, may not be altogether without its advantages.

The attention of all the colleges has been necessarily fixed to a greater or less extent upon the working of the system which the War Department is now trying to carry out, and all are probably in a better position to make an estimate of its advantages and disadvantages than they were a year ago. Considerable correspondence has been carried on with different institutions relative to special cases as they arose, and a number of important suggestions have been made by them, some of which may form the basis of future deliberation and action. To President Fellows, of Maine, special thanks are due for the valuable work that he has done in this connection.

The chairman of the committee has had two prolonged interviews with the Chief of Staff of the Army, the first of which resulted in an extension of the detail of military officers to colleges from two years to three, and the second in a better mutual understanding of some of the points at issue between the colleges and the Department. The position of the Department, stated in the briefest form, is this, that, since the Government furnishes officers and equipment for giving military instruction, it has a right to expect both a hearty

cooperation and an equivalent return from the colleges; that, since military instruction is the end sought by the law and by those who are charged with the administration of it on behalf of the Government, that instruction should be made efficient, and the colleges should, as far as necessary, organize their schedules of work accordingly; and, still further, that, while these details are of great advantage to the individual officers concerned, and thus to the entire military establishment, yet the primary need of the Army is to have its officers directly at work with their respective commands. The force of this last consideration will appear when it is stated that 20 per cent of the officers of the Army are now absent on detached service, and it can be well understood that this fact is an occasion of very grave concern to the head of the Army. It also serves to explain the reasons for wishing to detail to colleges no officers but those on the retired list, a policy which, however desirable from the point of view of the Army, is utterly impracticable from the point of view of the colleges. There is one other point upon which the officers of the Department feel that the necessities of the situation are not always sufficiently considered by the colleges; that is, colleges in a few instances have insisted that if they could not have some particular officer detailed they would prefer to have none at all; and, while the Department is desirous of considering the wishes of the colleges as far as possible in each case, it feels that a specific insistence of that kind, without regard to conditions which may exist in the service, is not reasonable or justifiable.

In response to a suggestion from the chairman of the committee that a meeting of the committee of the association with the Chief of Staff and other officers of the War Department might result in a better understanding and more harmonious action, General Chaffee expressed his very cordial assent and his willingness to arrange for such a meeting.

GEO. W. ATHERTON, *Chairman*.

H. C. WHITE. At the last convention the following matters were referred to the committee on military instruction:

Resolved, That the committee on military instruction is directed to try and secure some modification of War Department General Orders, No. 94, relating to military instruction in the land-grant colleges, abolishing the fixed five-hour per week requirement for military instruction, and allowing such colleges larger liberty in arranging their programme of weekly exercises.

Resolved, That the committee is further directed to submit to the association at its next convention a draft of recommendation to be, if approved, urged upon Congress looking to more complete provision for the military instruction required of the land-grant colleges.

The report was received and referred to the section on college work and administration for consideration (see p. 91).

INDEXING AGRICULTURAL LITERATURE.

In the absence of A. C. True, chairman of the committee on this subject, his report was presented by W. M. Hays, of Minnesota, as follows:

W. M. HAYS. I want to premise this written statement prepared by Doctor True by stating that this committee has been in existence twelve years, and two of its main objects have been achieved. One is to secure within the Department of Agriculture a scheme of indexing agricultural literature; the other is to have the Library of Congress do the printing, so that institutions and individuals desiring indexes of different classes of agricultural literature may secure them at a nominal cost.

The formal report of the committee follows:

The past year has been marked by two important events in the progress of the work of indexing the literature of agriculture and agricultural science by the Department of Agriculture: (1) The printing of the first installment of a card index of agricultural periodicals by the Department Library, and (2) the publication of a general index to the first 12 volumes of the Experiment Station Record and Experiment Station Bulletin No. 2, by the Office of Experiment Stations.

The card index of agricultural periodicals comprises author and subject indexes and already about 7,000 cards have been printed. The periodicals thus

far indexed are *Annales de la Science Agronomique*, 1884-1903, *Landwirthschaftliche Jahrbücher*, 1872-1902, and *Die Landwirthschaftlichen Versuchsstationen*, 1859-1902.

Any number of copies of each card can be purchased as desired. Arrangements have been made with the Library of Congress for the printing and sale of these cards, but the indexing and proof reading are done in the Library of the Department. Circulars of information concerning this work were widely distributed last March to libraries, institutions, and to individuals interested in agriculture and related sciences. The result is a list of subscribers which warrants beginning the work, and it is hoped that the list will be greatly increased after the cards which are ready for distribution have been examined.

The publication of the card index for Department publications has been continued during the past year, as usual, and now numbers 7,483 cards in each set. Libraries and institutions throughout the country continue to apply for the cards, and frequent letters of appreciation of their usefulness are received.

The general index to the first 12 volumes of the *Experiment Station Record* and *Experiment Station Bulletin* No. 2 is a subject index which makes a volume of 671 pages.

"The index contains about 125,000 entries, arranged under nearly 55,000 divisions and subheads. It covers all of the experiment station and Department publications received for abstracting up to the beginning of January, 1901, and nearly all of the foreign literature up to that time. It therefore brings the index of this literature practically down to the close of the year 1900; and, as it dates from the beginning of the experiment stations under the Hatch Act, it covers a period of the greatest activity in the development of agricultural science." The preparation of this index involved a vast amount of painstaking and tedious labor on the part of the editor of the *Experiment Station Record* and his associates, and its successful completion is a very considerable achievement.

The importance of this great work to students, teachers, and investigators is very great. The demand for it has already exhausted the first edition of 1,000 copies, and a second edition is being printed.

The card index of experiment station literature issued by the Office of Experiment Stations has now reached 25,600.

A list of publications of the Agriculture Department 1862-1902 with analytical index (pages 623) has been published by the Superintendent of Documents, Government Printing Office.

A. C. TRUE.
J. A. CLARK.
E. DAVENPORT.
W. M. HAYS.

Mr. HAYS. It is my private opinion, not a part of the committee's report, that this association ought to take some active steps through its executive committee to push matters both as to preparation of the cards and as to their publication by the Library of Congress.

The report of the committee was accepted.

The convention adjourned to meet at 8 o'clock p. m.

EVENING SESSION, TUESDAY, NOVEMBER 1, 1904.

The convention was called to order by J. C. Hardy, of Mississippi, the second vice-president.

President W. O. Thompson was introduced, and delivered the annual presidential address, as follows:

ANNUAL ADDRESS OF THE PRESIDENT OF THE ASSOCIATION—SOME PROBLEMS IN THE COLLEGES OF AGRICULTURE AND MECHANIC ARTS.

I. I propose for our consideration this evening a very plain and I trust a very practical theme, upon which I desire to offer a few remarks suggested by my own experience and observation. No effort will be made to discuss in any theoretical way the many interesting questions that pertain to education, but

rather to take a broad and comprehensive view of the field and the institutions we represent, with such suggestions as may be helpful.

(1) I assume that there is no lack of appreciation of the fact that these institutions now represent the great national movement in which both nation and State are cooperating with a clearly defined purpose of providing such a type of education as can be readily justified by its relation to the development of our country. Education is strictly a developmental function in which the State seems inevitably to take a larger and larger part. Here the logic of the situation will become sufficiently manifest to warrant a larger participation on the part of the nation as a matter of national development. If such larger part should be taken by the nation, the manner in which such increased expenditures would be made is a matter not now possible of forecast. The varying and sometimes conflicting interests would probably effect such compromises in legislation as to divert the efforts from what might be regarded as in accordance with the most approved theory. It is not necessary to produce here an array of figures prefaced with a dollar mark in order to assure us of the greatness of our work. The contributions made by the National Government in the original Morrill Act have been more or less efficient, depending largely upon the wisdom of the States. After all has been said that can be said on that matter, it remains true that that original act is the foundation on which the colleges stand. The second Morrill Act is a very clear and definite contribution, in which there is a renewed and enlarged participation on the part of the Government. It is not assumed that the national grants are adequate to the maintenance of such colleges as are needed. The smallest States, or the States with the least amount of undeveloped resources, will find before them problems too large for an adequate solution with the limited means at their hands. Indeed, the States where conditions are most unfavorable form the strongest argument for national aid. Here it is that undeveloped resources are few, and here it is that existing resources need to be most carefully husbanded. If the National Government can be justified for undertaking what may be termed the developmental functions of government—and I take it that the history of the past seventy-five years justifies such undertaking—then it would seem the part of wisdom to protect the whole country, and to see to it that no portion of the country is to be so depleted in resources that the maintenance of a population is impossible. It would seem, therefore, that the National Government might with every propriety interest itself in the development of the least fertile and most unlikely portions of the country for the general reason that the nation's interests are as wide as her territory. This phase of the problem is the more urgent because it is here that States will be slow to take hold of the problem, chiefly because they lack the knowledge needed in order to direct them in the wise application of scientific methods to the problem, and further because such States are not usually sufficiently aroused as to the relation of research to state development. On the other hand, the States having a large amount of undeveloped resources can readily see the advantage of development, and are so moved by the prospect of assured profit that they readily make appropriations for investigation and research as an investment, if not in the interest of science.

(2) We are well aware that there is a great diversity of interest shown among the States. This interest has manifested itself in some cases by large and generous appropriations and in others by rather meager provision. There can be no question about the individual State's right, and I also believe of its duty, to take up the developmental functions of government and give its own territory most careful consideration. It is not that in the support of what we would term "technical education," "industrial education," or perhaps better, "economic education," the State will receive immediate returns upon its investment, for that is not always true, but that in such long-time investment, calculated to perpetuate the resources of the State, and to keep the legacy of our fathers as valuable for our children as it has been for us, the State will find ample justification for its expenditures. Men often debate the constitutionality of certain measures, the wisdom of them or the political effect of them, but when they have once been made and men of a later period see the wisdom of such public enterprise, there is little disposition to criticise the action. The present movement in agricultural education has some immediate returns that are a justification, but the complete justification will be at the hands of our children. It is worth our while to keep clearly in mind that this expenditure must inevitably increase. I do not suggest that it will increase with great rapidity, but that the increase of expenditure for education will go with equal step with the increase of the efficiency of our civilization. Indeed, civilization itself as it progresses makes increasing demands upon

the citizens. Primitive life is very simple and beautiful under primitive conditions, but under the conditions of a highly organized civilization primitive life would be decided evidence of degeneration. Civilization brings not only its opportunities, but its duties as well. Education is therefore a constantly expanding problem. These colleges of agriculture and mechanic arts must recognize that up to date their work is only outlined. They must, then, not only as the preservers of the past, the protectors of the future, but as the designated agencies of the State, stimulate and develop the possibilities of both land and men. These institutions therefore stand in a very important relation to society and must help to solve the problems of practical living for the millions of our industrial classes.

It is not unnatural that in the presence of this large expenditure of money and of the tendency to increase this expenditure of money as time goes on the thoughts of men should turn to a consideration of the results of this national movement in education. I have no desire to enter into a discussion that might be tabulated in figures. For our purpose here this evening it might be well to remind ourselves, however, in the first place, that this national movement has given great importance to work in agriculture in the United States Government. The Department of Agriculture now stands as the nation's testimony to the importance of the problems with which it deals. Apart from the movement for these land-grant colleges, it might be seriously doubted whether there could have been such a development of the nation's work as is now organized in the Department of Agriculture. We recognize the importance of the work undertaken by the Government and also the generosity toward the States as shown in the two Morrill acts. We can not fail to recognize the helpful cooperation of the Department of Agriculture with the colleges and stations. Too much could not easily be said in praise of this work. On the other hand, we are quite as much under obligation to recognize the helpful attitude of the several States in making possible the highest efficiency of this national movement. They have gone at the matter with a steady purpose and a steadily growing enthusiasm. The movement has not been by any means a rural one. Our city populations have come to see the intimate relation between the development of agriculture in this country and the prosperity and safety of much of our commerce. They have seen how it affects the quantity of our food supplies, the health of our people, and the permanence of much of our prosperity. Those of us engaged in the agricultural colleges recognize, therefore, that our work could be so incomplete as to be extremely unsatisfactory but for the logical development at Washington. It is also true that they without us should not be made perfect. Indeed, every enterprise of this association has made manifest that the interest of the nation, of the States, of the colleges, and of the people are all one. The work of investigation, the work of supervision, the work of stimulating and aiding the local enterprises all unite to emphasize to us the fact that the nation has been pretty well aroused. The further development of this work must inevitably emphasize the common interest of the entire country and so lead to an increasing intelligence as to the real unity of the country. In the large and broad field of the nation's interests the Department of Agriculture in its several fields of work may be regarded as the logical outcome of the Morrill Act and also as the nation's appreciation of the importance of the colleges and experiment stations. Without design on the part of anyone there has gradually grown up an institution at Washington which gives expression to the national ideals, just as the local college expresses the ideals of the community in which it is located. I am disposed, therefore, to say that the colleges of agriculture and mechanic arts have fully justified their existence by the national influences that have been set to work as a consequence of their founding. On the other hand, the results in a local way that have been realized from these colleges are by no means to be despised. They have wrought out local problems and stimulated local enterprise. They have trained some valuable citizens and produced some efficient men and women. This in itself would be ample justification, but through the agency of these efficient men and women the resources of the country are not only being perpetuated, but increased, so that both local and national governments are finding their patrimony undiminished. These institutions, while devoted to the cause of education, have pointed out the possibilities of increased revenues and trained men to protect themselves in the strenuous struggle for existence.

The results realized from the establishment and maintenance of these land-grant colleges are not to be looked for entirely in the graduates of such institutions or in the renewed interests that may be aroused in either agri-

culture or mechanic arts. This system of education, which in a way is different from anything else ever undertaken, guards peculiarly the country's ideals concerning the permanent welfare of the masses of the people. I do not think it could be proved that these colleges came in response to a demand from the multitude, but they came rather in response to a demand on the part of a few farseeing men. These men recognized, what I think all now can readily see, that such institutions would be an efficient agency in cultivating on the part of the masses of the people an appreciation of higher attainments and greater excellence in the useful industries of life. It is impossible to measure the value or the power in such enlightened appreciation. It has been truly said in connection with the significance of an educational system in its relation to the progress of civilization, and concerning the duty toward the government of those receiving it, that we can not appreciate it except by considering it from the collective point of view. That is to say, in another way, that the whole people must encourage and maintain a system of education in order that the individuals may be brought to a greater appreciation of it and thus saved from their own tendency to degeneration. This elevating influence of the land-grant colleges is by no means their least valuable result. It is not to be forgotten that the benefits of an education to the individual are proportionately less than the advantages to the other members of a community. I think we are prone to look upon education from a purely individualistic point of view. We are prone to measure it exclusively for what it can do for the individual, forgetting oftentimes that what it does for the individual is but the beginning of its real service. We have not yet entirely escaped the fallacy that agricultural education is for the farmers only and that the work of the experiment stations is for the rural districts. It is true that the primary benefits will be realized first among the people in the rural districts, but it is equally true and highly important that we recognize the truth that education of any sort is a social process the benefits of which can not be confined to the persons engaged in it. Agricultural education touches vitally every interest of society both urban and rural. The experiment station is the guardian of the avenues as truly as of the fields.

Since, then, we can not find the full fruits of our system of education in the fields or in the individuals, we would do well to study its wider importance and deeper significance. In this connection, permit me to say that the very creditable exhibit of the colleges of agriculture and mechanic arts at St. Louis has, in my judgment, been a demonstration of the unity of all education, and in so far as an exhibit could testify, this one—the first one—has shown that the type of education in these colleges has not only ample justification, but occupies an important and hitherto neglected field.

In the phase of education now under discussion there is a manifest tendency to emphasize the materials of education rather than the results of it. It is so easy for us to fix our minds upon the importance of luxuriant yields in the harvest, the splendid types of live stock, or the margin of net profit that producing these things will realize. No doubt these are important considerations. I would not in any degree minimize their importance. Indeed, if we can not exhibit these as among the results of our education there would be great difficulty in justifying such a movement as a new departure in education. When, however, we have done all these things we have not received the most valuable results. It is when the pursuits of life have been made more efficient, and through the efficiency of these pursuits men are made more efficient, and through the greater efficiency of men society itself is more efficient and stable, that government finds its beneficent purposes realized and its investments justified. I regard it as of the highest importance that these ideals shall become the common property of our people. It is no small problem for these land-grant colleges to recognize this problem and deal with it effectively. Our banner must float in full view of the civilization which we encourage.

II. Turning now from what may be called the problems of ideals, I desire to give some attention to the more practical problems of operation, and here I bring to our attention the conditions in farm life that influence for good or evil the efficiency of agricultural education. These conditions, I dare say, are familiar to the members of this association, but are worthy of a quiet hour at our annual meeting. Many of them are general, in the sense that they are to be found wherever agricultural colleges occupy the attention of men. Some are local, in the sense that they are more noticeable in some communities than in others, or in the sense that they are peculiar to particular communities. I make no effort to distinguish these, but call attention to such as are within the horizon of my

own observation. These conditions in themselves present a very serious problem. Indeed, they are a series of problems, some of which seem inevitable and perhaps incapable of satisfactory solution. Among these I mention:

(1) The tendency away from the farm, which is so manifest as to be the cause of great anxiety in many communities. There can be no doubt that our cities have had a large accession of the best material in the rural districts. These persons, with a certain moral superiority and excellence of natural endowment, and with manifest inferiority in education, have forced their way to the front in the cities and have become the living examples of the splendid quality of body and mind and heart produced on the farm. This efficiency is to be accounted for in part on the theory of personal taste. Not every person born on the farm is adapted to farming pursuits. People are disposed to follow their likes and avoid their dislikes. The ambitions of men oftentimes reveal their cherished ideals. This, however, does not completely account for the marked tendency away from the farm. We must recognize the prejudice there is against the drudgery associated with much of rural life. We must also recognize the fact that the American people regard the rural accumulations as inadequate and oftentimes as too slow. We recognize also that the rural population has not cultivated a just appreciation of its own importance and of its own dignity. The proverb has it that "every man wants to live in the next county." This restless discontent and unwillingness to solve the problems of life in spite of our surroundings is an evil that grows by what it feeds upon. Something is to be said also concerning the failure to give young men and young women proper opportunities for personal advancement. The young business man feels that he can win when he has opportunity. The business world recognizes that no loss is sustained by giving such young men opportunity. I do not undertake to discuss the reasons in the case, but I think we shall agree that the facts warrant the statement that many a farmer's boy lacks the opportunity for individual initiative so essential for independent positions. The prospect of dependent subordination being continued too long naturally arouses a young man's ambition for a position where he can do for himself. He desires to be his own man and to conduct his own business. There can be no just criticism upon that kind of ambition. It is essential to the perpetuity of a free people. These several items named above operate to help the young man in his decision toward the business world and away from the productive world. The agricultural college has been unjustly charged with educating young men away from the farm. We may as well recognize, however, that in spite of the agricultural colleges this tendency continues. It is no small part of our work to cultivate such a sentiment as will retard this tendency. We should not fail, however, to recognize that under absolutely perfect conditions a large number of rural people should find their way to the city. We can not make lawyers out of all sons of lawyers. Just now the ministry is decreasing in numbers, but we can not look to the manse as the only base of supply. Farmers should not expect all their children to follow the plow or be queens in the kingdom of domestic economy. Such an ideal, if realized, would encourage the class system and open the way for a large amount of inefficiency while closing the door to many and making impossible some of our greatest achievements. There should be a free movement toward the city and an equally free movement toward the farm. In other words, farm life must not be the last resort; it must not be the refuge of necessity; it should be the life of choice, and I may say of enthusiastic choice. It is evident that it has not always been such a choice, but in many instances men have dignified themselves and the farm by deliberately choosing to lead an independent life rather than to rush into the miserable artificialities of much of our city life. It is to the population capable of such a choice that we must look for the elements that will check the too strong current away from the farm.

(2) This tendency is increased, in my judgment, by the fact that fewer men are needed in agricultural pursuits. The improvement of machinery has done something to intensify farming at certain periods of the year and rendered it unnecessary to keep a large force of men constantly available. The law of supply and demand would therefore cooperate to reduce the rural population. On the other hand, the multiplication of machinery in civilization has increased the demands for men through the opening up of so many new methods of business. The modern methods of transportation have reduced the hours of labor, and the specialization of labor has combined to give the laboring population a larger share in the earnings of society and a wider distribution of these earnings. We must recognize also that the improvement of farm machinery has greatly increased the investments necessary for successful farming. Not

every man can afford these investments. He may not be prepared to use them intelligently and therefore profitably. The result is in many communities that we have a large number of sales annually. Men whose lives have been spent in rural pursuits restlessly turn from the farm to ordinary labor as a means of livelihood. The result is an absenteeism on the farm. City men and men of some means have been buying land either as a safe or speculative investment. The result is a species of landlordism on the one hand and of inferior farming on the other. Under such conditions it may not be expected that renters' sons will remain on the farm and become the sturdy yeomanry of the country. Neither is it probable that the children of these people will manifest any great interest in agricultural education. There is a manifest tendency toward intelligent farming. It is evident that the old methods are often expensive to the point of wastefulness. Men lacking education are not profitable even as employees. Much less are they capable of satisfactory service as farm managers for owners of land. Such people are now moving to our cities for ordinary day labor, in the hope that their children may sometime become clerks or subordinates in the great whirl of commerce. They are unfit for the farm, are prejudiced against it, are unwilling to fit themselves for it, and eventually swell the population that inhabits the cheapest quarters in our cities or ekes out a miserable existence in a small village. Such people are not needed on the farm, and eventually they become superfluous in the town or city.

(3) A third specification among these conditions lies in the difficulty in bringing town or city people to rural life. They are quite willing, many of them, to live at a convenient distance from the city with a large investment in a small area of ground for personal comfort and a certain type of luxury that only the country can bring, but they are not easily brought to do the actual farm work necessary for the development of agriculture. We can not conceive of a country as a city, made up of town lots of 10 to 20 acres in area. The truth is that the city-bred people have little conception of what rural life really is. Many of them have an exaggerated prejudice concerning it. The training in action, associations, exciting amusements, and all that go to make up the externalities of city life unite to unfit an individual for the peaceful pursuits of rural living. Whatever hope there is, therefore, for the rural districts must eventually come from the rural districts themselves. It is to the population on the farm that we must turn for the perpetuity and improvement of rural life. The record made in the past by choice rural individuals in the city has greatly helped and improved the city. I see no evidence that the city will ever help or improve the country. The agricultural college, therefore, will find one of its most pressing and important problems in the country itself. It may be very entertaining and quite fashionable to chat in a city parlor about the beauties of agriculture, but the real problems of agriculture are on the farm and not in the drawing room.

(4) A fourth specification is the question of profits. There is no doubt that men desire to make money and that the profit in farming determines the attitude of many for or against this pursuit. Many young men leave the farm because they see that their fathers have spent a life without accumulating much money and because the fathers oftentimes complain that they have not made money. It is not uncommon under these conditions to see a greatly impoverished farm associated with an unfilled purse. As an individual question, we can not blame any man for having a desire for an improved condition. We can not ask him to stay in a place where there is no prospect of improvement. If he were willing to do this he would be fitted neither for a farmer nor for a business man. It is not, therefore, the personal phase of this question that I am now suggesting. It is rather the general question of profit in farming as having to do with the tendency away from the farm. We recognize that the speculative values in farm lands constitute no part of ordinary farming. The man who buys cheap land at \$10 per acre and holds it for ten years and finds it worth \$30 per acre has not made money by farming; he has made money by speculative investment in farming lands. As soon as it is realized that this speculative value is an uncertain quantity the attractiveness of such investments ceases. Multitudes of farmers can not be and ought not to be speculators; they should be farmers, and the problem is to make them profitable farmers. In the consideration of this question we must recognize the impoverished condition of much of the farming land of our country. To be sure we have recognized this as a fact. I appeal now to recognize it as a condition: a condition that threatens the permanent usefulness of the farm and the farmer. I find a very widespread belief that much of our farming land never can be made profitable for the individual farmer. If this is a permanent condition our colleges and experi-

ment stations should take the lead in making those things known and in bringing the Government to a realization of that condition. Surely this impoverished soil has some place in the national economy. There is some way of turning it to good account. The law of diminished returns as set forth in our standard works of political economy makes it entirely clear that the scale of wages is determined by the land cultivated without profit, or, to put it in another way, the land cultivated at the highest rate of expenditure. In my judgment the permanently profitable condition of farm land is considerably menaced by the area of impoverished soil in the country. So far as my observation goes, but little attention has been given to this condition as influencing the general conditions of rural life. I am persuaded, however, that it not only tends to keep down farm wages, but that it harbors an inferior population and from nearly every point of view threatens the most important conditions of rural life.

I recognize, however, that not all of this impoverished soil is hopelessly so. This leads me to say that intelligent operation of the farm is necessary for any margin of profit. This intelligent operation and management is impossible without education. Some farmers have learned the lesson of profitable farming after an experience of twenty-five years. That experience was valuable, but a very expensive education. The purpose now is to give to the young farmer, while in his teens, an education that will enrich him with the experience of other men gained after a long period of years. In other words, he is asked to invest very much less money in his education than he will pay for his experience. At the same time his era of profit will begin at 25 instead of at 50. The movement for agricultural education is still in its infancy. We are still in the apologetic stage. We need a propaganda accompanied by a demonstration that shall convince men that intelligence properly applied will produce results on the farm just as certainly as elsewhere.

As bearing upon this question of profits I recognize that there are other elements. The question of markets, their availability, the long or short haul, good roads, methods of transportation, and similar elements often enter into the question of the profit of agriculture. The tendency up to date has been to lay the entire burden of all these things upon the local community. It may be that it shall always remain so. This may add to the expense of local production while not making it clear that some obscure places are in any better condition.

The above-named particulars are sufficient to arouse our thought as to the seriousness of the condition that confronts a growing civilization. If conditions were not serious there would be no necessity for much ado about the importance of agricultural education or the necessity of government aid in such matters. The seriousness is not a new phase of the condition. The only thing new is that the recognition of this condition is more general than heretofore. The awakening among us of our convictions upon this subject, accompanied by a general desire to make such improvement in conditions as shall largely justify our efforts, is a most encouraging feature. This is justification for a stronger appeal that I can not make to the representatives of the great cause of technical and industrial education. Let me bring renewed emphasis, therefore, upon one or two things as we move along.

III. I refer to the well-recognized problems of connecting education with farming. All here agree that we have passed the time for unintelligent farming. Indeed, it would have been better if we had never reached that time. The fact remains, however, that a large portion of the agricultural work of the country has been a blind trust in the moon, or in Providence, or in luck. The multitudes, however, have long believed that the farmer's boy needed an education if he proposed to be a lawyer or a minister. We appeal for an equally abiding conviction that the boy who is to be a farmer must have an education. The one idea seemed to be that the only way to learn to do a thing was by doing it in an unintelligent and expensive way. The modern idea is that we shall learn to do things by doing them under competent supervision and in a most economic way. The agricultural college therefore is an expensive thing in itself, because it centralizes all the expensiveness of ignorance under an organization that proposes to remove ignorance and supplant it with intelligence and skill. The fallacy that unintelligent men can do farm work needs to be entirely removed. The truth is that it requires less intelligence to dig a ditch for a sewer in the city than to prepare for a tile drain on the farm. In the one case there is an association with other laborers, the foreman, and a large amount of concentrated supervision. In the other case there is no such association, but a demand for intelligence that can supervise itself. Even the ordinary operations of the farm require men who are equal to their own emergencies and who can assume

their own responsibilities. In the larger questions of farm economy, farm management, and the many problems that have been so interestingly discussed in the meetings of this association there is call for a grade of intelligence, of executive ability, and of management much higher than is ordinarily appreciated.

IV. Another phase of this appreciation lies in working out an educational programme that shall do the thing desired. This association has already discussed and in general decided the main features of what, in its judgment, an agricultural education should be. Considerable time and labor have been spent upon the classification and adjustment of subjects and the time to be given to these several subjects. There is now general agreement that this work has been well done. I do not look for any serious or revolutionary modification of this programme. The problem seems to be one of natural and, as I think, necessary expansion. I should not ignore the criticism that has been made of agricultural colleges, although I do not desire to be understood as supporting it. Some of it has been intelligent, wise, and helpful, but much of it has been erratic, zealous, and ill-informed. It has been said that agricultural courses are not well adapted to the ends desired. It has been intimated that our courses of study do not carefully conform to the spirit of the Morrill Act. It has been said also that they do not meet the most pressing needs of the agricultural classes. These are serious statements and in a way constitute a charge against intelligence or the intelligence of those to whom the oversight of these colleges is intrusted. So far as these objections have any force it may be found that a more generous provision of money would remove most of them. Agricultural education is working under very serious limitations. Most people and a very considerable percentage of legislators have failed to appreciate that agricultural education is of necessity expensive. It is to be expected that every effort, however sincere, can not always be wisely directed. We may therefore look for some unwise use of money and for the abandoning of certain lines of work. Making due allowance, however, for all these things, there remains the outstanding fact that the limitations of these colleges have been a serious handicap. Those in the association who have had most generous support have proved to be most largely serviceable not only in their own States, but to the general cause of agricultural education. In the present programme of this association we are to discuss a number of the questions that bear upon this very problem. Whether these colleges shall do elementary work or whether they shall do more advanced work will in many instances resolve itself into a question of money. There is a sentiment in the country that these schools should confine themselves to what might be termed "practical education." We hear it and read it in the press that there is no great demand for scientific agriculturists—at any rate, that such demand could be met by a few colleges. We are told that the higher and more scientific pursuits should not be abandoned, but that the more important and practical phases of agriculture should be emphasized and the work in that direction greatly enlarged. Certain phases of agricultural effort, like the agricultural institute in Iowa and the winter schools in Wisconsin and Minnesota, have attracted considerable attention and called forth much praise. The tendency, especially in the West, to take active interest in stock exhibits is quite marked. On the other hand, severe criticism has been brought upon agricultural colleges for experimental feeding, which costs three or four times what the stock market will support. We have heard it said that such education would pauperize every farmer in the State.

I mention these things not for approval or disapproval, but for the purpose of calling attention to the fact that the programme of the agricultural colleges is not yet in its final form.

I call attention to another fact in connection with it, that all these special features are expensive. The taxpayer is not exclusively devoted to the cause of agricultural education. We shall probably not reach a point very soon where we shall be free from adverse and oftentimes captious criticism.

V. As bearing upon this general topic and as presenting another specific problem, I make reference to the movement for agricultural education in the rural schools. In general this is the outgrowth of the agricultural college and follows the line of other educational development in that most improvement has come from above. The highest education has stimulated the elementary education. It is natural, therefore, that the agricultural college should stimulate the elementary education in the rural schools. This is more than a passing phase of the subject of nature study. The local influence of a school should always be for the improvement of its constituency. There is no place where more widespread good can be done for agriculture than in the rural schools. What might

be termed agricultural extension work might well be the subject for considerable thought by every agricultural college of the country. If it be true, as I think we all agree, that one of the great functions of the agricultural college is to arouse and maintain such an interest in agricultural pursuits as shall commend them to the rural population, I think we shall also agree that the teaching of agricultural science in the rural schools would be a splendid appetizer for an agricultural education. The need of this becomes more imperative when we recognize that agriculture differs from many other pursuits in that it is not disposed to take care of itself. The engineering interests of the country, the banking interests, the business interests are alert and awake. We may depend upon them to take care of themselves. Every college of engineering in the country looks carefully to the commercial demands that are made upon its graduates. The standard of education, the subjects to be pursued, the kind of instruction to be given are largely determined by commercial conditions. If this is true so far as agriculture is concerned, the country has not waked up to it. It seems incumbent, therefore, upon the teachers of agricultural education to carry on a propaganda. We can save the business of agriculture to our best people only by putting it on a plane where the best people are demanded in its management. The recompense of reward must not be entirely forgotten in the adjustment of this problem. I look, therefore, for a future adjustment in our programme of studies that shall make provision in our colleges for a department devoted to the expansion of agricultural education among the rural districts. This work will not be confined to efforts in the rural schools, but will be somewhat parallel to the correspondence work now carried on in engineering lines and indeed in many literary lines. The problem of agricultural education will not be solved until the agricultural colleges have been brought into close and vital relation to the agricultural populations. This touch with the agricultural population I regard as of more vital importance than touch with the schools.

VI. I suggest another phase of this problem in the adjustment of the subject of military instruction in the colleges. I recognize that this subject is up for discussion in the programme of this meeting and introduce it here with no desire to encroach upon that discussion, but for the purpose of bringing it to your consideration in some of its general features as observed in my own experience. What is known among us as "General Orders, No. 65," has forced this question to the attention of many of the schools. Reports from Washington are to the effect that this order is not complied with in a number of the colleges. An investigation into the work actually done raises the issue whether General Orders, No. 65, is in accordance with the Morrill Act. That act, as generally understood, makes military tactics mandatory in all these colleges. The extension of the education therein provided is a matter of subsequent development and should be given consideration in connection with the chief idea of the Morrill Act. It seems incumbent, therefore, upon these colleges, and perhaps upon this association, to seek for a clearer definition of the duties imposed upon the land-grant colleges by virtue of the Morrill Act. The act provides that certain subjects, including military tactics, should be taught. The Government has never undertaken to determine in what manner any of these subjects shall be taught or the extent of the teaching, or in any way to suggest a schedule, except in the case of military tactics. This has been undertaken by the Department of War, but I am at a loss to discover any warrant in law for much that is contained in the latest order issued to these colleges.

Without attempting to direct the association, I suggest that it is well to consider here whether the general idea of these colleges be in industrial education rather than military education. If I am correctly informed, a literal compliance with General Orders, No. 65, will occupy about one-half of each day in the week throughout the entire year. The assignment to colleges is usually limited to the detail of a single officer. Where the attendance is large and where, as in the case of the institution in which I serve, there are as many as 800 and sometimes more in the cadet battalion, it is manifestly impossible for any single officer to perform all the duties in connection with military tactics. The cadets in these institutions are not competent to take the place of instructors. All that can be expected of such cadets would be ability to control in the ordinary movements of company and battalion drills. Moreover, there is necessity of a constant change in the roster of the cadet officers, thus making their efficiency more questionable. The more theoretical and general topics suggested for instruction are manifestly impossible for such officers. The instruction of the officers and non-commissioned officers of the organization at the Ohio State University gives the commandant a class of more than one hundred men. Manifestly that is more

than a single officer can do if he is to meet the requirements laid down. I assume that the idea of military education as set forth in the Morrill Act was to lay the foundation for the making of soldiers, and not the technical education of army officers. The amount of work, the kind of work required, and all other such questions, therefore, should be determined not by an army ideal, but by the conditions under which these colleges must work. It would seem, therefore, that a complete military education is out of the question, and that the work should confine itself to the teaching of the important and fundamental principles only.

Not wishing to discuss this question at all in detail, I mention it here for the purpose of suggesting to the association the necessity of a careful consideration of the place that military tactics should occupy in our programme of subjects. There is manifestly no uniformity of practice among the colleges. Moreover, the War Department has insisted upon a strict compliance with General Orders, No. 65. In former years this association has waited upon the authorities with reference to this subject. It would seem now more than ever incumbent upon us to make further investigation of the subject and for the association to take up such methods as shall bring about a general uniformity. This matter, in my judgment, should not be left to a single-handed controversy between a particular college and the War Department.

By way of conclusion, I now desire to suggest to the association that the expansion of the type of education for which these colleges stand is a pressing necessity. The more civilization itself develops the more imperative will be the demands for education. Moreover it is to be expected that with the development of civilization the expenditure for protective purposes will relatively decrease, while the expenditures for the developmental functions of the Government will steadily increase. Education is the most important of all the developmental functions in which the Government engages. I lay it down, therefore, as almost a self-evident truth that the tendency of the State in the matter of education is permanent and that the extent of the work is sure to increase. This applies to the movement for public schools, for State universities, and for all other types of public education. Now, these land-grant colleges, whether separate institutions or whether associated with State universities, represent a distinct type of education, whose importance will not decrease, but whose work will expand with the development of our civilization. Indeed, a good argument could be made to show that these colleges are more closely related to the progress of civilization than any other type. But passing that argument, I wish only to impress upon ourselves at this time the fact that we are engaged in a work that shall be greatly increased in the future. There ought to be, therefore, more concerted action possible among these schools. At any rate I suggest that there ought to be from this time on a vigorous discussion of our relation to the expanding civilization in which we live and of the ways and means by which these colleges shall be brought to the highest efficiency. The States should be brought to realize that all provisions for these colleges are for the present only. They are a part of the State and of the nation and are truly national colleges located within the States for national development. Their future is certainly an increasing one and their needs will steadily increase. Let us appreciate our opportunity and bring to the people of this country a realization, not only of the importance of the work done, but the duty of giving these colleges adequate support.

On motion, the convention adjourned to meet the next morning at 9 o'clock.

MORNING SESSION, WEDNESDAY, NOVEMBER 2, 1904.

The association was called to order at 9 o'clock a. m. by the president.

DEATH OF MAJOR ALVORD.

H. C. WHITE. The executive committee called attention in its report yesterday to the sad occurrence of the death of Major Alvord. I now move that a committee of three, consisting of President Patterson, of Kentucky; Director Henry, of Wisconsin, and Director Armsby, of Pennsylvania, be selected to prepare suitable resolutions of regret concerning the death of Major Alvord.

The motion was seconded and carried.

ADAMS BILL AND MONDELL MINING SCHOOL BILL.

H. P. Armsby, of Pennsylvania, offered the following resolution:

Resolved. That the executive committee be instructed to continue its efforts to secure the passage by Congress of the bill increasing the appropriation to the agricultural experiment stations and the mining school bill.

On motion of W. A. Henry, of Wisconsin, the executive committee was instructed to appoint a time for the discussion of this subject (see p. 64).

STANDING COMMITTEES.

The question of the status of standing committees was briefly discussed and the matter was referred to the executive committee for report at the next convention.

METHODS OF TEACHING AGRICULTURE—THE TEACHING OF AGRICULTURE IN THE RURAL SCHOOLS.

The report of the committee on this subject, which discussed "The teaching of agriculture in the rural common schools," was read by H. T. French, of Idaho, in the absence of the chairman of the committee, A. C. True, as follows:

In accordance with the apparent wishes of the association as expressed in an informal discussion of the report of this committee at the meeting in Washington last November, this ninth report of the committee on methods of teaching agriculture^a is devoted to a discussion on the feasibility of teaching agriculture in the rural common schools, and suggestions regarding the nature and extent of such teaching. In this discussion the term "common schools" is taken to mean schools giving instruction in grades below those of the high school, and the term "rural schools" will include not only the schools in extremely rural districts, but also those in villages and small towns which draw largely on the adjacent country for pupils and financial support. It should also be understood that in this report attention is confined to matters relating to the teaching of agriculture in the rural schools as ordinarily organized in our public school system. We have not undertaken here to discuss the advisability of the establishment of county or district elementary schools of agriculture as separate institutions or the courses of instruction suitable for such schools.

DEVELOPMENT OF INDUSTRIAL TRAINING IN THE COMMON SCHOOLS.

Industrial training as a subject for regular instruction in the common schools has been until recently confined largely to manual training in the city schools, and even in these schools it is still far from being fully developed. However, the number of schools in which manual training (other than drawing) is given has increased rapidly during the past thirteen years. In 1890, when the Bureau of Education first began publishing the statistics of manual training in the United States, there were only 37 cities of 8,000 population and over in which manual training was taught in the public schools; in 1902 there were 270 such cities. The schools referred to are those in which other subjects than manual training are mainly taught.^b In 25 of these schools manual training is given in all grades, including the high school; in 64 it begins with the first grade; in 33 it is confined to the high school, and in 206 (more than three-fourths of all the schools) it is given in some of the grammar grades.

The introduction of manual training into courses of study which were already crowded has involved problems requiring close and careful study of the needs of the pupils, and has generally resulted in greatly increasing the efficiency of the schools in which manual training is now taught. The effort has been made to retain all the essentials of the branches commonly taught in such schools

^a For previous reports see U. S. Depr. Agr., Office of Experiment Stations Buls. 41, p. 57; 49, p. 29; 65, p. 79; 76, p. 39; 99, p. 86; 115, p. 59; 123, p. 45; 142, p. 63, and Cires. 32, 37, 39, 41, 45, 49, and 55.

^b There were also, in 1902, 163 schools devoted chiefly to manual and industrial training.

and add the manual training. This has been done by a careful grading of the pupils, by securing better teachers and text-books, and by judicious and careful elimination of the nonessentials in the various branches.

The time to be given to manual training, so that it will not interfere with efficient instruction in other branches, has been carefully considered, and experiments with regard to this have been tried. Some idea of the time occupied by manual training in some of our larger cities can be gained from the following statements: In Boston 2 hours per week are devoted to manual training throughout the fourth to ninth grades, inclusive, the boys having drafting, woodworking, and clay modeling, and the girls sewing and cooking. Manual training in the schools of New York City extends through seven grades, with a total of 4 hours per week for both boys and girls during the first $5\frac{1}{2}$ years, and $4\frac{1}{2}$ hours during the second half of the sixth year and all of the seventh year. In the seventh and eighth grades of the Washington schools the girls have one 2-hour exercise a week in cooking and sewing, and the boys a similar period in woodworking. In Allegheny the boys have shop-work $2\frac{1}{2}$ hours and drawing $1\frac{1}{2}$ hours a week for 3 years, and a supplementary course of 1 year. In Toledo each ward school has one manual training period of $1\frac{1}{2}$ hours a week. The time devoted to manual training in Los Angeles is two 20-minute periods a week through the first four grades, and three 25-minute periods throughout the next four grades. The work includes paper folding and cutting, raffia work, reed basketry, cardboard construction, sloyd, drawing, shop practice, sewing, and cooking. In San Francisco manual training for boys includes one lesson per week of 50 to 60 minutes in the seventh and eighth grades. Comparatively few of the schools having manual training give less than an hour a week to this work, and the great majority allow 2 or more hours for it. In most cases the work extends over 3, 4, or more years. The average cost of the plant for manual training in the 270 cities reporting work of this kind in 1902 (not including manual training high schools) was \$20,000, making a total investment for this purpose of \$5,400,000. The current expenditures for teachers, materials, tools, etc., in 1901-2 were nearly \$1,000,000.

MOVEMENT TO INTRODUCE AGRICULTURE INTO THE RURAL SCHOOLS.

More recently there has developed a movement to introduce the elements of agriculture into the rural schools. This movement has been largely an outgrowth of the nature study movement which for a number of years has been encouraged by such agencies as the Cornell University Bureau of Nature Study and the agricultural colleges in a number of other States, as well as by many prominent educators connected with other kinds of schools and colleges. Then came the school garden movement, and in this as in the nature study movement the city schools have led those in the country, partly because the children in the city schools have taken a greater interest in such work on account of its novelty to them, and partly because the city schools through better organization and equipment and special teachers have been able to make experiments of this kind more readily than the rural schools. In these experiments, as might have been expected, mistakes were made. Nature study, according to some of its advocates, was to be elementary science, with a long list of scientific names, with classifications based on stipules, scales, and caudal appendages, and with a "why" for everything. It involved such a universal knowledge of science that teachers were appalled at the prospect of having to prepare for the innovation. On the other hand, some of the advocates of nature study would have no formality, no classification, no plan—whatever came to hand was a subject for nature study. Facts were to be learned, not because of any bearing that they might have upon the symmetrical development of the children's faculties, but simply because they were interesting. There was no logical beginning to such study, no pedagogical sequence, no end. Fortunately there were other teachers and students of education who took neither of these extreme views, but who saw in nature study an opportunity to bring the children into more sympathetic and helpful relations with their natural environment, and at the same time increase their fund of useful knowledge. These teachers, when located in city schools, have brought to the consideration of their nature study classes the trees, shrubs, flowers, and vines found around the city homes, in the parks, and in the lawns, and have studied the insects, birds, and other animal life of the city in relation to this plant life. In the country they have considered the plants, animals, birds, and insects which surround the farmer and aid or hinder him in his work, giving much attention to their economic importance and very

little to any marked peculiarities they might chance to possess. Such nature study forms an excellent basis for the subsequent study of more formal agriculture. It has been tried in both city and country schools, and has been found to furnish not only a means for arousing and sustaining the interest of the children, but also through its economic limitations an outline sufficiently definite to enable the teacher to know where to stop, and yet sufficiently flexible to enable her to adapt it to local conditions.

Nature study such as this, having an agricultural trend, is about all that has been attempted in the way of teaching agriculture in the rural schools until quite recently. Within the past two or three years, however, State superintendents of public instruction, the officers of some of the agricultural colleges, the National Educational Association, the American Civic Association, as well as a number of other organizations and numerous individuals in various official positions have interested themselves in the introduction of elementary agriculture and gardening in the rural schools. The National Educational Association now has a special committee of educators of national repute considering this subject. The American Civic Association has one department devoted to children's gardens and another to rural improvement. Last June, in Chicago, an organization known as the American League of Industrial Education was organized to—

"conduct an educational campaign for an industrial public school system which should include the teaching of domestic science and both agricultural and manual training in all public schools; * * * to promote the establishment of school gardens in connection with all public schools, where every child would be taught to be a lover of nature and of the country, and trained toward the land as a source of livelihood rather than away from it; * * * to advocate the establishment of public manual training school farms in every county in the United States and of as many such manual training school farms in the vicinity of all cities, by State, municipal, and national governments, as may be necessary to give to every boy the opportunity to learn how to earn his living by his labor and to till the soil for a livelihood and get his living from the land."

Some of the State school authorities, officers in agricultural colleges, and county superintendents of schools have prepared outlined courses in agriculture which have exerted a strong influence toward the teaching of agriculture in the rural schools. Such courses have been prepared, for example, in Missouri, Illinois, and Indiana, and for a group of schools under one superintendent in Durham, N. H., and vicinity.

The Illinois course in agriculture was prepared by the dean of the college of agriculture, and gives the following reasons for teaching agriculture in the public schools:

"(1) To cultivate an interest in and instill a love and respect for land and the occupation of agriculture.

"(2) To create a regard for industry in general and an appreciation of the material side of the affairs of a highly civilized people.

"(3) To cultivate the active and creative instincts as distinct from the reflective and receptive that are otherwise almost exclusively exercised in our schools.

"(4) To give practice in failure and success, thus putting to the test early in life the ability to do a definite thing.

"(5) To train the student in ways and methods of acquiring information for himself and incidentally to acquaint him with the manner in which information is originally acquired and the world's stock of knowledge has been accumulated.

"(6) To connect the school with real life and make the value and need of schooling the more apparent.

"(7) As an avenue of communication between the pupil and the teacher, it being a field in which the pupil will likely have a larger bulk of information than the teacher, but in which the training of the teacher can help to more exact knowledge."

The course is arranged by months, and gives suggestions for a large number of experiments and observations bearing on all the divisions of agriculture. Considerable reading along agricultural lines is suggested, as well as drawing, composition, and other work intended to correlate agriculture with other school work. All technical words likely to be used frequently in this connection are defined.

This course has been in the hands of Illinois teachers one year, and the superintendent of public instruction reports "an increased interest throughout the State in the study of agriculture." He says:

"In nearly every county in the State a good beginning has been made, and in several counties the interest and progress has been little less than remarkable. In many rural schools the subject is being studied, following the outline found on pages 166-180 of the Illinois Course of Study for the Common Schools. Some of the graded schools are doing systematic and intelligent work along this line and are conducting in connection with the schools successful school gardens. That the interest is growing is shown by the many thousand requests for corn and seeds, which are received by the secretary of the farmers' institute."

According to statistics collected by the superintendent of farmers' institutes in Illinois, fourteen counties report that in nearly all the schools agriculture is being taught as suggested in the State Course of Study, and in fifteen other counties a majority of the schools are attempting this work.

In addition to agricultural work in the schools of Illinois, considerable is done by the State College of Agriculture, the superintendent and the secretary of farmers' institutes, and county superintendents of schools to arouse an interest in farm life by means of clubs of farmers' boys, which are organized in the different counties for the purpose of conducting experiments at their homes in testing improved varieties of corn and sugar beets: These clubs hold regular meetings similar to farmers' institutes, and once a year are given places on the programmes of the county farmers' institutes. Several of these clubs have had lecture courses, with lectures from men prominent in the agricultural colleges and experiment stations, and some of them have gone on excursions to different agricultural colleges. Eight thousand of these boys exhibited corn of their own raising at the Louisiana Purchase Exposition, and 1,250 of them drew prizes ranging from 50 cents to \$500. The girls have similar organizations, which are devoted to the consideration of subjects relating to the farm home.

Similar organizations of boys and girls are also found in Iowa, Ohio, and Texas, all of them organized under the auspices of the State agricultural colleges or of agricultural journals. The membership of the boys' and girls' clubs in Ohio is nearly 2,000 and in Texas over 1,200, though the latter organizations are little more than a year old. Everywhere that work of this kind has been done it has seemed to meet with enthusiastic approval. The boys and girls take pride in their organizations and in doing in a small way what their parents do more extensively.

In Missouri the course in agriculture for the public schools was prepared several years ago by the State superintendent of schools. This course has been superseded by a bulletin prepared by the State superintendent of schools and published by the Missouri State Board of Agriculture in September of the present year, entitled "Elements of Agriculture for the Public Schools." This bulletin advocates presenting the subject of agriculture "(1) by experiments at home and in the field, (2) by studying facts as given in texts and bulletins, and (3) by school gardens connected with school grounds."

"Teachers are advised to utilize school grounds or gardens near the school as experiment stations, to have pupils experiment at home and make field observations, and to secure bulletins from the Department of Agriculture, at Washington, D. C., from the Missouri State Board of Agriculture and from the agricultural college, both at Columbia. The school library should have copies of several good texts. Appeal to the pupils' interests along all lines and enlist the cooperation of the parents."

The course in agriculture, as outlined in the bulletin, includes (1) studies on soil—origin and composition, kinds, plant food, improvement, rotation of crops, and experiments; (2) roads—value of good roads, road drainage, artificial roads, good dirt roads, influence of roads, road laws, and experiments; (3) studies on seeds and related subjects—germination, vitality, and parts of seeds, with experiments in corn planting, corn growing, corn judging, selecting seed corn, and observations and experiments with corn (similar treatment of wheat); (4) studies of plants—their classification, relation to soils, buds, twigs, etc.; (5) orcharding and gardening—apples, grapes, berries, home gardening, commercial gardening, enemies to gardens; (6) study of insects; (7) stock raising and feeding—horses, mules, cattle, sheep, hogs, and domestic fowls. Numerous experiments and observations are suggested throughout the bulletin. Two bulletins have also been issued by the College of Agriculture of the University of Missouri which are intended for use in the public schools. One of these is on Plant Propagation and the other on The Principles of Plant Production—the Seed.

The superintendent of public schools, the College of Agriculture, and the State normal schools in Missouri are cooperating in agitating the introduction

of agriculture into the public schools throughout the State. This is done by addressing teachers' institutes, farmers' institutes, and other public meetings; by conducting summer schools for teachers at the College of Agriculture, in which special attention is given to courses which will prepare them for teaching agriculture, and by conducting regular courses in agriculture at the three State normal schools.

The State superintendent of public instruction of Indiana, in his State Manual and Uniform Course of Study for the Elementary Schools of Indiana, 1904-5, includes a nature-study course intended "to acquaint the pupil with his environment and to train him to see and understand the relationship and meaning of common things," and a course in elementary agriculture. The subjects suggested for consideration in the nature course are largely the plant and animal life of the farm and the garden. The course in agriculture is simply an outline intended to guide the teacher, taking up for first consideration plant and animal products; then the soil, its formation, nature, tillage, and enrichment; and, finally, plant life. References are given to a number of bulletins and elementary text-books of agriculture.

The department of agriculture of the University of Minnesota has been actively engaged in promoting the teaching of agriculture in the rural schools, and its officers have prepared a bulletin on Rural School Agriculture for the use of the teachers in that State. In Wisconsin the State superintendent of the public schools and the officers of the College of Agriculture of the University of Wisconsin have done much for the introduction of agricultural teaching in the country. One of the results of their efforts has been the enactment of a law requiring teachers to pass examinations in agriculture. Similar laws have also been enacted in Maine, Nebraska, North Carolina, South Carolina, and Tennessee.

The training of teachers along agricultural lines is receiving considerable attention not only in Missouri, as mentioned above, but also in other States. The College of Agriculture of Cornell University now provides a two-year normal course in nature study and gardening. In Michigan ten county normal training schools have recently been opened for the purpose of training teachers for the rural schools. The course of study recommended for these normal schools by the State superintendent of public instruction includes agriculture. The agricultural colleges in Connecticut, Nebraska, and North Carolina have for a number of years conducted summer schools for teachers, at which more or less attention has been given to nature study and agriculture. At the Nebraska summer school in 1904 there were 23 students in nature study and 30 in agriculture. At the North Carolina summer school for teachers in 1904 there were enrolled 977 teachers, of whom 477 took work in agriculture. The summer school of the South, conducted at the University of Tennessee with an annual attendance of from 1,000 to 1,300 teachers from all parts of the South, gives considerable attention to nature study and gardening.

One thing that has given a great impetus to the movement for the introduction of agriculture into the public schools has been the improvement of text-books and works of reference. Within the last year or two a number of elementary text-books in agriculture have been published, and some of these seem very well suited to use in the rural schools. One of the indirect results of the appearance of these text-books has been legislation in a number of States requiring the teaching of agriculture in all the rural schools, and adopting text-books for that purpose. State adoption of text-books in agriculture has been made in Alabama, Georgia, Louisiana, North Carolina, and Tennessee. Every city and county in Virginia, a majority of the counties in Maryland, about 15 counties in California, and a number of counties in Florida have also adopted text-books in agriculture for regular use in the public schools. It is estimated from teachers' reports that at least 12,000 children received instruction in agriculture in North Carolina last year. Thus it will be seen that there is quite a strong movement for the introduction of agriculture into the rural schools and that this movement is rapidly gaining momentum.

OBSTACLES TO THE GENERAL INTRODUCTION OF AGRICULTURE INTO THE RURAL SCHOOLS.

There are many things which have a tendency to hinder the rapid progress of this movement. One of these is the conservatism or apathy of school officers. This applies not only to local officers but also to State superintendents of public instruction, county superintendents of schools, and the officers of agricultural

colleges in many of the States. Some of these officers doubt the possibility or wisdom of teaching agriculture in the common schools on account of the lack of text-books, or the lack of trained teachers, or for some other reason. It is, however, a notable fact that in the States where such officials are cooperating actively and earnestly in conducting a lively campaign along these lines, agriculture is actually being taught with considerable success, and teachers who feel that they are unprepared in this branch are flocking to summer schools, where they can make the necessary preparation.

Another difficulty is that the teachers in rural districts are mostly women with little or no normal training either in the ordinary branches taught in the common schools or in special subjects. There is no teaching profession in the rural schools. The salaries are so low that they do not attract those who have prepared themselves for the profession of teaching. As a consequence, most of the teachers found in rural schools are beginners or those who have not been sufficiently successful to be called to positions offering a higher salary. Most of the men who are teaching in the country are doing so merely for the purpose of raising money to go away to school or to go into business.

These conditions result in a rapid shifting of teachers from school to school, which is another serious drawback to progress of any kind. Again, the terms of school are too short. When a child can go to school only four or five months in the year there is little time in the few years that he is in school for the study of other subjects than reading, writing, arithmetic, geography, and history. Before much progress can be made in the introduction of agriculture into the rural schools much must be done for the general improvement of those schools. This improvement will be brought about partly by remedying the conditions already mentioned in the school districts as they are now organized, and partly through the consolidation of small districts and the organization of centralized schools, including rural high schools where village high schools are not readily available for those who can go beyond the grammar grades. The practice of consolidating schools has already been resorted to in California, Colorado, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, South Dakota, Vermont, Washington, and Wisconsin. Notable movements toward the consolidation of schools have recently been inaugurated in Louisiana, Missouri, and North Carolina. While this movement toward consolidation has spread to all parts of the country, there are relatively few localities in any State in which the system has been adopted and brought into working order. Hence the full effect of this important change in school policy has not been felt, even in the States where consolidation is a feature.

In the localities where consolidation has been thoroughly tried, however, it has usually met with general approval. It has enabled the school officers to grade the schools more effectually, thereby opening the way to greatly enriched courses of study; to lengthen the term of school; to employ better teachers at higher salaries and keep them for a number of years, and to employ several teachers instead of one, each to give instruction in only a few subjects or to only two or three grades, thereby opening the way to the more continuous and profitable employment of the pupils' time. It is notorious that in the ordinary country school, where the teacher has from 25 to 30 recitations in a day and can not personally direct the study of the children, the latter waste fully half of their time in idleness or mischief-making. This and many other defects of the rural common school are remedied by consolidation, and the transportation of pupils from distant parts of the district at public expense is accomplished at no additional expense per unit of attendance. The Commissioner of Education, in his annual report for 1903, says: "The possibilities of consolidation in the way of furnishing better and cheaper schools have been fully demonstrated, and such being the case its general adoption would seem to be only a question of time."

While consolidation opens the way for the more general introduction of courses in agriculture in the rural schools, it does not help supply the demand for teachers competent to give such special instruction. This can only be done by a more general and concerted effort on the part of the agricultural colleges and schools and the State normal schools, at present through the introduction of short and special courses in agriculture for teachers, and later through regular normal courses in agriculture.

Fortunately, the attention of the general school officers throughout the country is now being strongly drawn toward the needs of the rural schools, and

in many States strenuous efforts are being made to improve the general condition of these schools. Our urban communities are coming to see more clearly that their prosperity is vitally associated with the prosperity of agriculture, and they therefore more readily assent to State taxation for the benefit of the rural as well as the city schools. Advantage should be taken of the increased prosperity of many of our agricultural regions to impress upon our farmers the wisdom of building better schoolhouses, improving the school grounds, increasing the pay of teachers, and introducing the teaching of agriculture in the country districts as an investment which will greatly aid in perpetuating and increasing the prosperity they now enjoy and make the lot of their descendants more fortunate than their own. The agricultural colleges and the farmers' institutes can have great influence in this direction.

OBJECT OF TEACHING AGRICULTURE.

Coming now to consider what should be the aim of instruction in agriculture in the elementary school and how it should be related to the general scheme of elementary education as formulated and approved by educational authorities, we have for our guidance the report of the Committee of Fifteen of the National Educational Association. In this report it is assumed and argued that the studies of the school fall naturally into five coordinate groups: (1) Mathematics and physics; (2) biology, including chiefly the plant and the animal; (3) literature and art; (4) grammar and the technical and scientific study of language; and (5) history and the study of sociological, political, and social institutions. Dr. W. T. Harris, U. S. Commissioner of Education, in a paper discussing this report and the necessity for five coordinate groups of studies in the schools, says:

"Each one of these groups, it was assumed, should be represented in the curriculum at all times by some topic suited to the age and previous training of the pupil."

Continuing, he says:

"The first stage of school education is education for culture and education for the purpose of gaining command of the conventionalities of intelligence. These conventionalities are such arts as reading and writing and the use of figures, technicalities of maps, dictionaries, the art of drawing, and all of those semi-mechanical facilities which enable the child to get access to the intellectual conquests of the race. Later on in the school course, when the pupil passes out of his elementary studies, which partake more of the nature of practice than of theory, he comes in the secondary school and the college to the study of science and the technic necessary for its preservation and communication. All these things belong to the first stage of school instruction whose aim is culture. On the other hand, post-graduate work and the work of professional schools have not the aim of culture as much as the aim of fitting the person for a social vocation. In the post-graduate work of universities the demand is for original investigation in special fields. In the professional school the student masters the elements of a particular practice, learning its theory and its art.

"It is in the first stage, the schools for culture, that these five coordinate branches should be represented in a symmetrical manner. It is not to be thought that a course of university study or that of a professional school should be symmetrical. But specializing should follow a course of study for culture in which the symmetrical whole of human learning and the symmetrical whole of the soul should be considered. From the primary school, therefore, on through the academic course of the college, there should be symmetry and five coordinate groups of studies represented at each part of the course—at least in each year, although perhaps not throughout each part of the year."

Discussing the second coordinate group, the biological, Doctor Harris argues that it should include "whatever is organic in nature—especially studies relating to the plant and the animal—the growth of material for food and clothing, and in a large measure for means of transportation and culture. This study of the organic phase of nature forms a great portion of the branch of study known as geography in the elementary school."

While it is probably true that eight years ago, when this was written, geography as taught in the primary grades of the best city schools included all the studies relating to the plant and the animal that were at that time considered necessary, it is also true that at the present time much of this study is intro-

duced under the term "nature study," and the child's knowledge of the phenomena of plant and animal life is much clearer and more definite by reason of the concrete methods employed in nature study.

In the average village and rural school nothing approaching adequate instruction in the biological group of studies has ever been given. Geography, as far as taught in the primary grades, has consisted almost entirely of text-book work, and has had in it very little that is concrete or that touches the experience of the child. Nature study, on the other hand, begins with the concrete—with the organic life of the school yard, the garden, and the farm. It has, therefore, a very definite and useful place to fill among the culture studies, particularly the biological studies of the primary grades. Elementary nature study, together with an informal study of local geography, might well supersede the formal study of geography during the first three or four years. This should be followed by more formal geography and nature study, the latter to be superseded by the elements of agriculture when the child is eleven or twelve years old.

Agriculture should not be confused with manual training as taught in the city schools. Manual training "relates to the transformation of materials such as wood or stone or other minerals into structures for human use," and draws more from the mathematical group of studies than from the biological. Agriculture, on the other hand, is confined mainly to things biological. Its purpose in the common schools is to awaken an interest in the work and life of the farm, show the progress being made in the improvement of farming, indicate the rational and scientific basis of modern agriculture, and give the pupil an outlook toward the work of the experiment stations, agricultural schools and colleges, and other agencies for his future education or assistance in his life work.

The motive for teaching agriculture in the rural school may, however, to a considerable extent be the same as that for manual training in the city school—namely, to bring the child into direct and sympathetic relations with the industrial life of the community in which he lives. Undoubtedly, manual training in the city school has an outlook toward the shop, factory, and kitchen, and in the same way agriculture in the rural school should be directly related to the practical work of the farm.

A REASONABLE PROGRAMME FOR AGRICULTURAL TEACHING IN THE RURAL COMMON SCHOOLS.

Whenever it is proposed to introduce the teaching of agriculture into the rural common schools the objection is at once raised that the curriculum is already crowded; there is no time for more. This is true. There is no time for more, but there is time for better. It would be undesirable and unwise to do away with any of the studies now regularly taught in the common schools, but it would be wise to make a more judicious selection of the topics to be included in the courses in the various branches and omit much which now occupies the time of the pupils but which is not likely ever to be of use to them. Prof. Frank M. McMurray, of the Teachers' College of Columbia University, in a recent article discussing Advisable Omissions from the Elementary Curriculum, and the basis for them,^a says, "Life is too full of large specific ends to be attained to allow time for work that has no really tangible object." As a basis for the rejection of subject-matter from school courses he holds to the following propositions:

"(1) Whatever can not be shown to have a plain relation to some real need of life, whether it be aesthetic, ethical, or utilitarian in the narrower sense, must be dropped.

"(2) Whatever is not reasonably within the child's comprehension, likewise.

"(3) Whatever is unlikely to appeal to his interest; unless it is positively demanded for the first very weighty reason.

"(4) Whatever topics and details are so isolated or irrelevant that they fail to be a part of any series or chain of ideas, and therefore fail to be necessary for the appreciation of any large point. This standard, however, not to apply to the three R's and spelling."

He does not favor the entire omission of any subject now taught in the elementary schools, but does recommend the omission of particular topics and details. Omission, however, is not the only remedy that he suggests for the

^a Ed. Rev., 27 (1904). No. 5, p. 478.

crowded condition of the elementary school curriculum. In the last paragraph of this article he says:

"In conclusion, although some large topics should be omitted, reform in the main is not to be effected by lopping off here and there, but by changing the present aggregation of ideas in each study to an organized body of thought. It is not the task of grade teachers nor of scientists, but of the most advanced and ablest students of education, who are as well posted in subject-matter as in the principles of education itself. Even these have more than a life problem in such a task."

It is along lines such as these that the curriculum of the rural schools may be so far improved that there will be ample space for the teaching of agriculture in an effective way. Just as the courses in the city schools have been improved and enriched by the introduction of manual training, so the teaching of agriculture in the rural schools, when once parents and teachers are convinced of its importance and benefits, will be found to be both practicable and advantageous.

In a rural school having a curriculum extending over about eight years the courses in nature study might follow in a general way the brief outlines given below. In these outlines it is assumed that the nature-study courses will extend over about six years, and be followed by a course in agriculture extending over two years.

NATURE STUDY.

During the first two or three years in school the children should spend a short time each week in forming an acquaintance with the birds, insects, flowers, trees, and other animal and plant life of the school yard, the roadside, and the wayside pastures and wood lots. This very pleasant and profitable way of gaining knowledge has been their principal occupation during the two or three years that they have been running about out of doors at home, and they should be encouraged and aided to extend their knowledge of the things in nature with which they are likely to come in daily contact throughout their lives. The teacher should go with the children on short walks around the school yard and along the roads during occasional noon intermissions, or on longer trips in the fields and woods on Saturdays. It would be well if only a few children were taken at a time; ten or fifteen are all that one teacher can manage on such occasions. Each trip should be taken with some leading object in view, such, for example, as a search for cocoons, or for grasshoppers, or for weed seeds; but this leading object should not shut the eyes of the children to other things. Let them see and hear and feel and smell; let them grow in strength as well as in knowledge. Tell them very little; they should do the telling. Better wait days and weeks for an answer from the children than tell them now and rob them of the pleasure of discovery, provided the subject is within their comprehension.

Nature study at first should consist mainly of observations. The perceptive faculties should be stimulated and developed. For this reason the exercises should never be continued so long as to become wearisome to the children. At first there will seem to be but little connection between the different observations made by the children, but the teacher should never lose sight of the fact that very real and definite relationships exist between the different plants and animals of a given locality and between these things and their inorganic environment. Gradually, therefore, these relationships should be brought out. The children should describe and draw the objects seen. This will lead to comparison and judgment. Suppose, for example, that the children examine two trees of the same species, one growing in open ground with an abundance of plant food and plenty of room for development; the other growing in a dense forest with little room for either root or branch; one with short, stocky trunk and dense, symmetrical top; the other with tall, slender trunk and small, irregular top. By comparing certain well-known features of bark and leaves the children will readily recognize the two trees as belonging to the same species, but it will require considerable exercise of the reasoning faculties and pretty good judgment for them to get at the causes which have brought about the marked differences between them. Such opportunities to reason and judge are frequently offered in nature study, and the teacher should improve every opportunity to place them before her pupils.

After the first year or two, the time depending on the progress the children have made, more attention should be given to studying life histories of plants

and animals (especially birds and insects), so that these may be recognized in all stages of their development, and their economic relations determined. This will enable the pupils to decide whether a given species is mainly beneficial or harmful and will set them to thinking about means of perpetuating or exterminating the species. This last consideration is the one which mainly determines the attitude of the farmer toward his field crops, domestic animals, and fowls, as well as toward the weeds and other pests that annoy him. When the nature-study teacher and her pupils have arrived at this point of view they will be in a position to pass over as unimportant such details as color of hair, length and number of teeth, number of leaves, length of petioles and internodes, and a hundred other peculiarities of plants and animals, except as these peculiarities have a direct bearing upon the perpetuation of the species or upon their usefulness or harmfulness to man. Such a point of view and such an attitude toward the things studied will aid greatly in developing in the children the faculty of critical discernment. This faculty, according to President Eliot, of Harvard, "ought to be carefully and incessantly cultivated by school, college, and the experience of life, for it is capable of contributing greatly to happiness as well as to material success."

Such critical studies of plants, animals, soils, weather conditions, and other natural objects and phenomena, in their relation to each other and to man, will give the pupils an excellent preparation to take up at the beginning of their sixth or seventh year in school the more formal study of the elements of agriculture.

ELEMENTARY AGRICULTURE.

The course in elementary agriculture may be given most appropriately during the last two years in the rural common school. The time to be devoted to this course will necessarily vary in different schools, but it is believed that on the average not less than one hour per week during two years will be required to make the course effective. A well-arranged and up-to-date text-book, with illustrations and suggestions for practical exercises, should be adopted as a basis for this study. A few such books already exist, and an increased demand would undoubtedly lead to the production of others and the still further improvement of books of this class. The text-book will in most cases be necessary as a more or less definite guide for the teacher, who will in all probability be without special training in agriculture. It will also be helpful to the pupils in giving a systematic view and in fixing definite knowledge of the subject, and to the parents in showing them what such instruction really involves and in creating an interest in the subject-matter of the books.

The instruction in the class room should be supplemented by simple experiments with soils, plants, and animals both at school and at home. Every effort should be made to connect the instruction with the home life of the pupils. As an aid to the accomplishment of this aim the pupils should be taken on occasional Saturday excursions to neighboring farms to see improved live stock, examine plans of buildings, and take notes on methods of cropping and cultivating. Visits to county fairs, where arrangements could be made to allow the older pupils to judge some of the live stock, fruits, and grain, and compare their scores with the work of the judges, would be fine training for the classes in agriculture. This scheme has been tried with older students of agriculture and has met with thorough approval. The officers of the fairs could probably be induced to offer prizes for products grown by the pupils and for other agricultural work done by them; or special exhibits of their work could be made at farmers' institutes or other meetings attended by their parents. All these things would tend to create an interest in farm life, and would encourage parents to make the farm more attractive to the children.

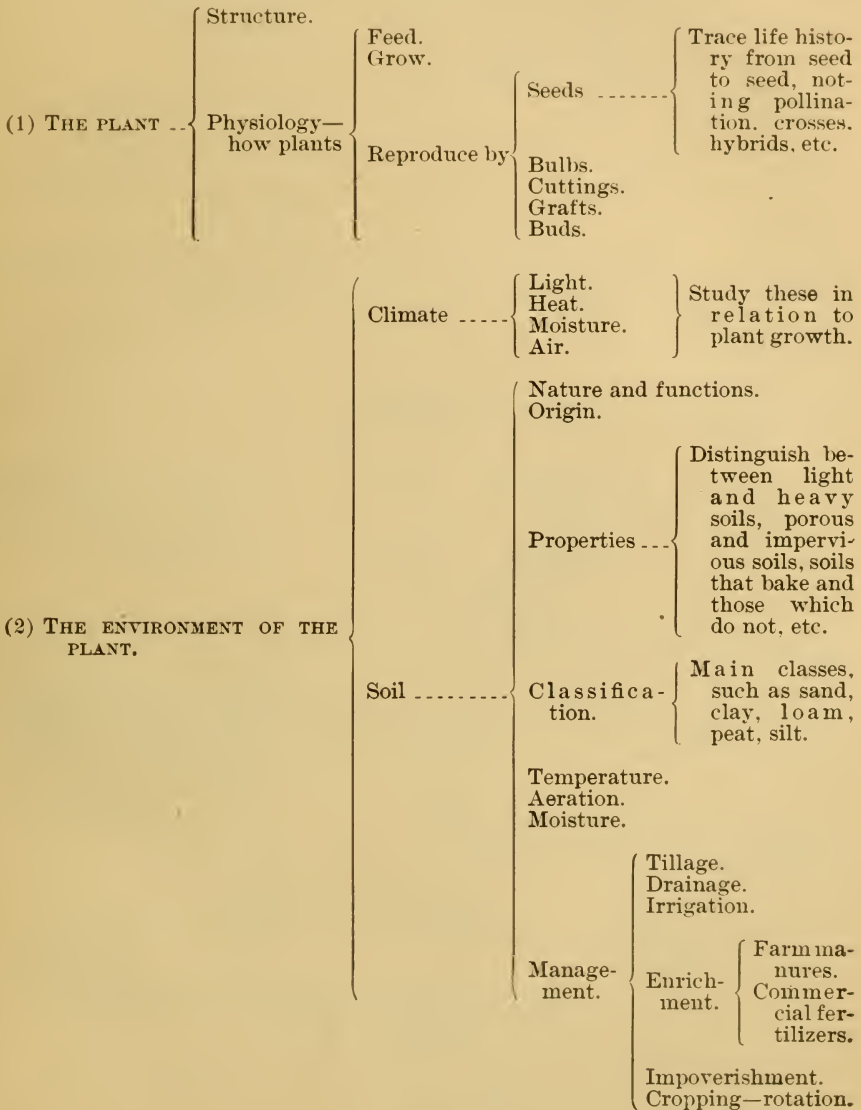
The schoolrooms should be provided with illustrative material consisting of charts, pictures, collections of specimens (largely made by the pupils), and boxes, cans, plates, and other inexpensive material which can be used in making apparatus for conducting experiments. There should also be a school library containing at least a few standard reference books on the different divisions of agriculture and the publications of the State experiment stations and the United States Department of Agriculture.

The text-book of agriculture should give an orderly and progressive treatment of the elements of plant production, animal production, and dairying, together with brief and very elementary discussions of a few topics in rural engineering

and rural economics. The following syllabus shows in a general way what such a text-book might include:

SYLLABUS OF ELEMENTARY COURSE IN AGRICULTURE.^a

I. PLANT PRODUCTION.



^a In this syllabus the same general arrangement of topics has been made as in the higher courses outlined by this committee, but it is of course to be understood that the treatment of these topics by the teacher in the common school should be brief, simple, and elementary.

- | | | | |
|------------------|---|--|---|
| | Classification..... | { Include only the most general classes, such as cereals, grasses, legumes, tubers, etc. | |
| | | Name.
Place in classification.
Varieties. | |
| (3) FARM CROPS. | Individual crops. (Study one or more of the leading crops of the region.) | Culture..... | { Preparation of soil.
Selection of seed.
Testing of seed.
Planting.
Cultivating.
{ Weeds.
Diseases.
Insects.
Birds.
Mammals.
Protection from pests.
Harvesting.
Marketing. |
| (4) FRUITS | { One or more of the leading fruits of the region should be studied in the same manner as farm crops. | | |

II. ANIMAL PRODUCTION.

- | | | | |
|---|--|--|--|
| | Horses .. | { Draft.
Trotting.
Roadsters, etc. | |
| (1) DOMESTIC ANIMALS—
THEIR TYPES AND
BREEDS. | Cattle ... | { Dairy.
Beef. | Bring out leading characteristics of one or two leading breeds of each type represented in a given region. |
| | Sheep ... | { Wool.
Mutton. | |
| | Swine.
Poultry.
Bees. | | |
| | | | |
| (2) CARE AND MANAGEMENT OF DOMESTIC ANIMALS. | Feeding | { Only the most general statements regarding the food requirements of different animals and for different purposes, and exercises in compounding rations suitable to a given region. | |
| | Hygiene | { Water supply.
Exercise.
Shade.
Condition of inclosures as to { Comfort.
Ventilation.
Cleanliness. | |
| | Preparation and care of product.
Marketing product. | | |

III. DAIRYING.

- | | | |
|---------------------|--------------------------------|---|
| (1) THE DAIRY COW.. | Type | { A more detailed study of the dairy type than was given under animal production. |
| | Feeding, care, and management. | |

(2) MILK -----	Composition	{ How determined. Relation to price.	
	Handling -----	Cleanliness	{ Stables. Cows. Attendants. Vessels.
		Straining. Aerating. Cooling.	{ Relation to souring [or tainting] of milk.
	Uses -----	For consumption as milk or cream.	{ Putting up in cans or bottles. Marketing.
		For con- densing.	{ Putting in cans and hauling.
		For cheese making.	
	Uses -----	Creaming --	{ By setting in pans. By use of sep- arator.
		For butter making.	{ Churning -- { Temperature. Kinds of churns. Salting. Coloring. Working. Packing. Marketing.

IV. RURAL ENGINEERING.

It is not thought that the pupils in a rural common school will be prepared to study the problems involved in rural engineering from the view point of the engineer, but it is hoped that there will be some opportunity to examine the plans and structure of good types of buildings, fences, roads, etc., and to devote some time to drawing simple plans of farms, buildings, and other works. The importance of good roads, hygienic water supply and sewage disposal, and of caring for farm machinery should be emphasized.

(1) FARM PLANS -----	{ Size and location of fields. Location of buildings, fences, drains, and roads.	
	Buildings -----	{ House. Barn. Outbuildings. Fences.
(2) CONSTRUCTION OF BUILDINGS AND WORKS.	{ Water system. Sewage system. Roads. Irrigating system { Only in regions where irrigation is practiced.	
(3) FARM MACHINERY -----	{ Interesting facts regarding the develop- ment of farm machinery in a way to encourage the more general use of im- proved machinery. The importance of caring for and repair- ing farm machinery.	

V. RURAL ECONOMICS.

Most of the topics under rural economics are too broad to be included in a brief course in agriculture, or too complex for the comprehension of common school pupils. It is thought, however, that some of the general principles of marketing and farm accounts might be taught in this connection. The main factors in marketing will probably be best considered in connection with the disposal of particular products as indicated above under plant production, animal production, and dairying. The following topics are appropriate for this course:

- | | | | |
|---------------------|---|--|--|
| (1) MARKETING----- | { | Preparation for market.
Choice of market.
Transportation.
Method and cost of sale. | |
| (2) FARM ACCOUNTS-- | { | Feed and milk records.
Crop records.
Breeding records.
Inventories.
Bookkeeping. | } This to include only the most general suggestions and a discussion of the importance of keeping full and accurate records. |

A. C. TRUE,
H. H. WING,
T. F. HUNT,
H. T. FRENCH,
J. F. DUGGAR,
Committee.

The report was accepted.

THE SOCIAL PHASE OF AGRICULTURAL EDUCATION.

A paper on this subject was presented by K. L. Butterfield, of Rhode Island, as follows:

I have been asked to speak in behalf of the study of "rural economics." This term is, I presume, supposed to cover broadly those subjects which treat of the economic and social questions that concern farming and farmers. The whole range of social science as applied to rural conditions is thus apparently made legitimate territory for discussion. In view of the importance and character of this field of study, it seems wise to approach it, if possible, through the avenue of its underlying philosophy. Only in this way can the validity of the subject be established and its place in agricultural education be justified. I have therefore chosen as a specific title "The Social Phase of Agricultural Education." In the treatment of the topic an endeavor has been made to hold consistently in mind the point of view of the agricultural college.

It is a principle in social science that the method and scope of any social institution depend upon its function. Therefore the organization, the methods, and the courses of the agricultural college should be made with reference to the function of the college. What is this function? What is the college designed to accomplish? What is its social purpose? Why does society need the agricultural college? Answers to these questions are of two kinds—those that explain the contemporary and passing functions of the college, and those that illustrate its permanent and abiding service to society and particularly to the rural portion of society. The college of yesterday was obliged to train its own teachers and experimenters; to-day it may add the task of training farm superintendents; to-morrow it may organize an adequate extension department. Courses and methods will change as new contemporary needs arise, but there remains always the abiding final service of the agricultural college—its permanent function. This function will be defined in different ways by different men, but I venture to define it as follows: The permanent function of the agricultural college is to serve as a social organ or agency of first importance in helping to solve all phases of the rural problem. We shall not attempt at once to argue this proposition. We must, however, try to answer the question. What is the rural problem? And in the answer may be revealed, without need of extended discussion, the mission of the college.

(1) The days are going by when agriculture may be classed with the mining industries. Soil culture is supplanting pioneer farming. Skill is taking the

place of empiricism. The despotism of the grandfather is passing. Applied science and business practice have been hitched to the plow. Yet the most obvious need of American agriculture is better farming. Improved farm land in the United States gives but \$9 of gross return per acre. The average yield per acre of corn is 23.5 bushels, whereas a very modest ideal would be double this amount. The wheat yield is 13.5 bushels per acre; in Germany nearly twice as much. These are crude, but legitimate, illustrations of our inferior farming. We must have greater yields of better products, secured at less cost per unit. The farm problem is therefore first of all a problem of increasing the technical skill of our farmers. Science unlocks the cabinet of Nature's treasures, but only the artist farmer can appreciate and use the storehouse thus opened to him.

(2) But produce growing is not the only aspect of the farm problem. Each effective pair of shears needs two blades; in this case produce selling is the other blade. Mere productiveness does not solve the farm question. The farmer cares less for the second spear of grass than he does for a proper return from the first spear. Business skill must be added to better farming methods. The farm problem is also a business question.

(3) The moment, however, we begin to discuss price we enter a realm where economic factors dominate. We commonly say demand and supply determine price; but effective demand and effective supply are the resultants of many forces. The supply of a given product is influenced by the cost of growing in various locations, by cost of transportation, by competition of other countries. The demand is influenced by the state of wages, by standards of living, by effectiveness of distribution. The farmer may not always control these conditions, but he must reckon with them. He must know the laws of economics as well as the laws of soil fertility. The farm problem becomes then an industrial question, for the farmer's prosperity is influenced most profoundly by the economic life of the nation and of the world. And in a still wider sense is the rural question one of economics. The industry as a whole must prosper. It is of no great moment that here and there a farmer succeeds. The farming class must prosper. Of course individual success in the case of a sufficient number of farmers implies the success of the industry, but it is quite possible to have a stagnant industry alongside numerous individual successes. The farmers as a whole must be continually and speedily advancing to better economic conditions.

(4) Nor may we ignore the political factor in the rural problem. Doubtless the American farmer, like most Americans, places undue reliance upon legislation. But we can not disregard the profound industrial and social effects of either wise or foolish laws. The political efficiency of the farmer will have much to do in determining class progress. Furthermore, the political duties of farmers must be enforced, their influence must continue to be exerted in behalf of the general policies of government. It is of vital consequence to our democratic government that the American farmer shall in nowise lose his political instinct and effectiveness.

(5) The consideration of the political phase of the question leads us to the heart of the farm problem. For it is conceivable that the farmers of this country may as a class be skilled growers of produce, successful sellers of what they grow, and indeed that the industry as a whole may be prosperous, and yet the farming class in its general social and intellectual power fail to keep pace with other classes. It is not impossible that a landlord-and-tenant system, or even a peasant system, should yield fairly satisfactory industrial conditions. But who for a moment would expect either system to develop the political and general social efficiency that American democratic ideals demand? Even if there is no immediate danger of either of these systems becoming established in America, we still desire that our farmers as a class shall secure for themselves the highest possible position not only in industry but in the political and social organization of American society. Indeed this is the ultimate American rural problem, to maintain the best possible status of the farming class. No other statement of the problem is satisfactory in theory. No other is explanatory of the struggles and ambitions of farmers themselves. The American farmer will be satisfied with nothing less than securing for his class the highest possible class efficiency and largest class influence, industrially, politically, socially. It is true that industrial success is necessary to political and social power, but it is also true that social agencies are needed in order to develop in our American farmers the requisite technical skill, business method, and industrial efficiency. The influence of such social forces as education, developed means of communication, the organi-

zation of farmers, and even the church, must be invoked before we can expect the best agricultural advancement. And the end is after all a social one. The maintenance of class status is that end.

This analysis of the rural problem is necessarily brief, almost crude, but I hope that it reveals in some degree the scope and nature of the problem; that it indicates that the farm question is not one merely of technique, fundamental as technical skill must be; that it demonstrates that the problem is also one of profound economic, political, and social significance. If this be so, do we need to argue the proposition that the function of the agricultural college is to help solve all phases of the problem? We all recognize the place of the college in assisting our farmers to greater technical skill. By what pleas shall we gain-say the mission of the college in ministering to rural betterment at all points, whether the conditions demand technical skill, business acumen, industrial prosperity, political power, or general social elevation? Why shall not the agricultural college be all things to all farmers?

Assuming that this statement of the permanent mission of the agricultural college is an acceptable one, the practical inquiry arises. Does the college, as now organized, adequately fulfill its function, and, if not, by what means can the defect be remedied? The colleges are doubtless serving the industrial and social need to some degree. But I believe that it is not unjust to assert that the existing courses of study in agriculture, the organization of the college, and the methods of work are not adequate if the college is to secure and maintain this supreme leadership all along the line of rural endeavor. This is not criticism of existing methods. The colleges are doing good work. But the present effort is partial, because the emphasis is placed upon the technical, and especially upon the individual, phases of the problem. The industrial, the political, and the social factors are not given due consideration. Our present-day agricultural course, on the vocational side, is chiefly concerned with teaching the future individual farmer how to apply the principles of science to the art of farming, and in training specialists who shall make further discoveries either in the realm of science or in the application of the scientific principle to the art. The technical element absolutely dominates the vocational portion of the agricultural course. Very slight attention is given to the discussion of other phases of the farm problem. To meet the needs of the future the whole spirit and method of the agricultural college must be "socialized"—to use an over-worked phrase for want of a better one. We must get away from the idea that the individual and the technical aspects of agricultural research and teaching are the sufficient solution of the farm problem.

When we ask, What are the means for "socializing" the agricultural college? the expected answer may be, The study of rural social science, or "rural economy." But I am pleading not merely for the addition of a few subjects to the course of study, but for an educational policy. The answer, therefore, will not be quite so simple. What, then, are the methods by which the college may more fully assume its function of helping to solve all phases of the farm problem?

(1) The indispensable requirement is that the college shall consciously purpose to stand as sponsor for the whole rural problem. It is to assume a place of leadership in the campaign for rural betterment. Whether or not it is to be the commander in chief of the armies of rural progress, it should be the inspiration, the guide, the stimulator of all possible endeavors to improve farm and farmer. This attitude of mind is purely a matter of ideals, deliberately formed in the light of the abiding needs of the farming class. It is the intangible but pervasive influence of an object which is perfectly definite even if avowedly spiritual. It is a question of atmosphere. It is a matter of insight. The college must have a vision of the rural problem in its entirety and in its relations. At the college we should find, if anywhere, the capacity to understand the ultimate question in agriculture. We know that this ultimate question in agriculture can not be expressed alone by the terms nitrogen, or balanced ration, or cost per bushel, but must be written also in terms of the human problem, the problem of the men and women of the farm. So we shall see the college consciously endeavoring to make of itself a center where these men and women of the farm shall find light and inspiration and guidance in all the aspects of their struggle for a better livelihood and a broader life. The college must avow its intention of becoming all things to all farmers. Whether this means the study of fertility, of animal nutrition, of soil bacteriology, or whether it means the consideration of markets, of land laws, of transportation, of the country church, of pure government, the college will lead the way to the truth.

(2) As the first requisite is that of the conscious ideal or purpose, the second is one of organization. It seems to me that the socialization of the college can not proceed very far until the principle of university extension is pretty fully recognized. The college must be in constant and vital touch with the farmers and their associations. Therefore each agricultural college should as rapidly as possible develop a definite tripartite organization which reveals the college in its threefold function as an organ of research, as an educator of students, and as a distributor of information to those who can not come to the college. These are really coordinate functions and should be so recognized. The college should unify them into one comprehensive scheme. The principle of such unity is perfectly clear; for we have in research the quest for truth, in the education of students the incarnation of truth, and in extension work the democratization of truth. Until these three lines of effort are somewhat definitely recognized and organized the college can not work as leader in solving the rural problem.

(3) The social sciences, in their relation to the rural problem particularly, must receive a consideration commensurate with the importance of the industrial, the political, and the social phases of the farm question. In research, for instance, the colleges should make a study of the history and status of these aspects of agriculture. As a matter of fact, we know very little of these things. There have been but few scientific investigations of the economic features of the industry, and practically nothing has been done in the more purely social questions. Here is a great untitled field. How the various farm industries have developed, a comprehensive study of the agricultural market, the relation of transportation to the industry, the tendencies as to centralization of farms and tenant farming; the sociological questions of rural illiteracy, pauperism, insanity, health, education, the effects of rural life upon character, religious life in the country—a hundred subjects of importance in the solution of the farm problem are almost virgin soil for the scientific investigator. It is the business of the agricultural colleges to assist, if not to lead, in such work of research. It is work that must be done before the social phases of agricultural education can be fully developed.

When we come to the course of study we face a question difficult for some colleges, because the agricultural curriculum is already overcrowded. I have not time to discuss this practical administrative question. I believe, however, that it can be worked out. What I wish to emphasize is the idea that in every agricultural course the social problems of the farmers shall have due attention. We should not permit a person to graduate in such a course unless he has made a fairly adequate study of the history and status of agriculture; of the governmental problems that have special bearing upon agricultural progress; of such questions in agricultural economics as markets, transportation, business cooperation, and of such phases of rural sociology as farmers' organizations, the country church, rural and agricultural education, and the conditions and movements of the rural population. For the college can not carry out the purpose we have ascribed to it, unless these subjects are given an important place in the course of study. We talk about the work of the college in training leaders, usually meaning by leaders men who are expert specialists or possibly farmers of extraordinary skill. Do we realize that the greatest need of American agriculture to-day is its need of social leadership? Nothing can be more imperative than that the agricultural college shall send out to the farms both men and women who have not only the capacity to win business success, but who also have the social vision, who are moved to be of service to the farm community, and who have the training which will enable them to take intelligent leadership in institute, school, church, grange, and in all movements for rural progress. Upon the college is thrust the responsibility of training men and women to understand the whole rural problem and from the vantage ground of successful farming to be able to lead the way toward a higher status for all farmers.

Possibly the argument for introducing rural social science into the agricultural course is chiefly a sociological one. But there is also involved a pedagogical question of most profound significance. For several decades the educational camp has been sharply divided over the ancient but recurring controversy between the Greek cultural ideal and the Roman utilitarian ideal. I venture the opinion that these two forces of educational idealism will soon reach a compromise which for all practical purposes will take this question out of the pale of serious debate. The classicist will concede that the scope of the term culture may be greatly enlarged and he may even allow a quite new definition of the cultivated man. It will be generally admitted, to use Professor

Bailey's phrase, that "every subject in which men are interested can be put into pedagogic form and be a means of training the mind." On the other hand the technical educator will concede that a college graduate in whatever course should be a cultivated man and that there are certain studies with which all cultivated men should have some familiarity. The technical college will, moreover, be compelled to employ instructors who can so teach the technical subject that it shall not only give the knowledge and training desired, but shall also yield sound culture, become truly liberalizing and vision giving. But a greater question remains. As society becomes more fully self-directive the demand for social leadership increases. Almost instinctively we look to the college-trained man for such leadership. We expect him to understand and to help answer the questions that society has to meet. It is not enough that he do his particular work well; he has a public duty. Only thus can he pay all his debt to society for the training he has had. Yet to-day our technical courses are largely engaged in training individuals who, barring some general culture, are highly specialized experts. What preparation, for instance, does the future engineer get in college for facing such a matter as the labor question? He is likely to be brought into close touch with this question. But as a rule he is not especially qualified to handle it. The point of view of the course he has pursued is technique, ever technique. He secures in college little incentive and less training for intelligent performance of his duty as citizen and as member of society. The problems of mathematics are not the problems of industry, and profound study of chemistry gives neither the premises nor the data for sound judgment upon social questions. These public questions can not be left to social experts. A democratic society must insist that all its educated men shall be leaders in solving society's problems. But even the educated men can not lead unless they have first been taught. I believe society has more to fear from technical experts who either neglect their social duty or are ignorant of the social problem than it has from highly trained specialists who have never studied Greek nor mastered Browning. Moreover, under modern conditions, have we a right to call that man cultivated who ignores the great social problems of the age? We face here one of the coming educational questions, How can the industrial course be made to train men for the social leadership the new régime demands? I see no answer except that the course must be made truly and broadly vocational, and consequently that large place must be given to social studies, and particularly to the concrete problems of government, industry, and social life.

If we examine our agricultural course from this standpoint, we shall have to admit that it has the flaw common to most industrial courses. It is too technical. It is not truly vocational. It does not present the social view point. It does not stimulate the student to social activity. It does not give him a foundation for intelligent social service when he shall go to the farm. He should study agricultural economics and rural sociology, both because rural society needs leaders and because, in the arming of the man, the knowledge of society's problems is just as vital as either expert information or personal culture.

(4) To carry out the function of the agricultural college we need, finally, a vast enlargement of extension work among farmers. This work will not only be dignified by a standing in the college coordinate with research and the teaching of students, but it will rank as a distinct department, with a faculty of men whose chief business is to teach the people who can not come to the college. This department should manage farmers' institutes, carry on cooperative experiments, give demonstrations in new methods, conduct courses of reading, offer series of extension lectures, assist the schools in developing agricultural instruction, direct the work of rural young people's clubs, edit and distribute such compilations of practical information as now appear under the guise of experiment-station bulletins, and eventually relieve the station of the bulk of its correspondence. Such a department will be prepared to incorporate into its work the economic, governmental, and social problems of agriculture. It will give the farmers light upon taxation as well as upon tree pruning. The rural school will have as much attention as corn breeding. The subject of the market—the "distributive half of farming," as John M. Stahl calls it—will be given as much discussion as the subjects bearing upon production. We shall find here a most fertile field for work. The farmers are ready for this step. They have, as a rule, appreciated the real nature of the farm problem more fully than have our agricultural educators. Perhaps at times they have placed undue reliance upon legislation. Perhaps in periods of depression they have overweighed the economic pressure as against the lack of skilled farming. But

the great body of farmers has rightly estimated the importance of the economic, political, and social questions as related to their ultimate prosperity. In grange meetings, for example, the subjects which arouse greatest interest are such themes as taxation, the rural telephone, the country school, and business cooperation. The explanation of all the farmers' movements is that the farmers believe the farm problem to be much more than a question of technique. They want light on the whole problem.

The college, chiefly through its socialized extension department, has a mission also to those professional people whose sphere of work is in the rural community. The rural educator, the country clergyman, the editor of the country paper, and even the lawyer and physician who deal with country people should have a large share in helping to solve the farm problem. They, too, need to know what the rural problem is. They, too, need the eye that sees the necessary conditions of rural betterment and the heart that desires to help in rural progress. By some of the same methods that reach the farmers themselves can the college instruct and inspire these others.

And, finally, the college will take its place as the "social organ or agency of first importance in helping to solve the farm problem in all its phases." The church, the school, the farmers' organization—all these social organs have their work to do. None can do the work of the others. But they should work together. Each should appreciate its own mission and its own limitations; each should recognize the function of the others, and all should intelligently unite their forces in a grand campaign for rural betterment. More properly than perhaps any other agency the socialized extension department of the agricultural college can act as mediator and unifier, serve as the clearing house and directing spirit in a genuine federation of rural social forces. Inspired by the conscious purpose of the college to help at all points in the solution of the farm question, informed by the knowledge acquired through research into the economic and social problems of agriculture, aided by a multitude of educated farmers trained in the colleges to know the rural problem and to lend a hand in its settlement, dignified by its status as a coordinate branch of the college activities, the extension department may well act as the chief agency of stimulation and unification in the social movements for rural advancement.

In this discussion the practical details of carrying out the programme advocated have not been touched upon. When once it becomes a distinct policy of the college to assume leadership in the movement for rural betterment, such questions as subject-matter for study, text-books, qualified instructors, and time in the curriculum will settle themselves. Neither has any attempt been made to give illustrations; and therefore this paper may seem dogmatic if not academic, a prophecy rather than an outline of progress, the statement of an ideal rather than a practicable programme. But I think there is abundant evidence that a current is setting in toward the enlargement of the work of the agricultural college along the social lines indicated. The rapid development of farmers' institutes, the growth of other phases of extension teaching, the sentiment of those in authority that the experiment station must soon slough off its work of education and confine itself to research, the holding of occasional conferences for rural progress, in which country teachers and pastors join with the farmers, the initiative of the college in federating various State farmers' organizations into one grand committee, the inauguration of several brief courses in agricultural economics and rural sociology, the cooperation of some of the colleges with the Carnegie Institution in an investigation into the history and conditions of agriculture in its economic and social phases, the pride with which a few of our colleges point to the increasing number of young men they are sending to the farms—all these facts seem clearly to indicate that the agricultural college will soon assert its function of leader in the endeavor to solve all phases of the rural problem.

If the analysis thus far offered is a correct one, the question of "rural economics" is far from being merely a matter of adding three or four subjects of study to the agricultural course. It involves the very function and policy of the college itself. It alone gives proportion to the problem of agricultural education, because, while distinctly admitting the need of better farming and the consequently fundamental necessity of the technical training of farmers, it emphasizes the importance of the economic and political and social aspects of rural development. And it thereby indicates that only by a due recognition of these factors, in purpose, in organization, and in course of study, can the American agricultural college fulfill its mission to the American farmer.

COOPERATION BETWEEN THE STATIONS AND THE U. S. DEPARTMENT OF AGRICULTURE.

This being the special order for the hour, E. A. Bryan, chairman of the committee of the association on cooperation, submitted the following report:

Your committee on cooperation between the stations and the U. S. Department of Agriculture would respectfully report that satisfactory progress has been made so far as the details of the arrangement of any cooperative work undertaken by the stations with the Department of Agriculture are concerned. Questions, however, of the most fundamental importance, involving the relations of the two institutions, having arisen, the executive committee of this association, on the invitation of the Secretary of Agriculture, held certain conferences with the Secretary, a report of which has already been made to you. It therefore seemed expedient to your committee, pending the period during which the executive committee was dealing directly with the problem, to submit no further recommendations in the premises. There will doubtless continue many questions for adjustment which will require the services of a standing committee, there being a similar committee appointed by the Secretary of Agriculture for that purpose.

E. A. BRYAN, *Chairman.*

E. A. BRYAN. It has been evident, I think, to all members of this association that for some years a number of questions have arisen between the experiment stations and the Department of Agriculture which would require adjustment. It was perhaps with a view to these questions that a few years ago a committee on cooperative work was appointed by this association, which from year to year has made reports. These reports were usually brief and related mainly to certain details of the contracts which might be made between the experiment stations and the Department of Agriculture relative to any given piece of cooperative work which might be undertaken by them. As this report indicates, very satisfactory progress has been made in that direction, but it has not been so apparent that the whole matter is settled by the arrangement of these small details. In fact, it has become more and more apparent that there are still more fundamental questions that remain unsettled, and while the policy of the committee thus far has been rather to avoid than to court much discussion in this body, yet the time seems to be ripe for a full and free discussion of the whole question involved.

The report was accepted.

A lively discussion, conducted with frankness but good feeling, followed, in which it was maintained that a clearer definition of the respective functions and limitations of the Department and the experiment stations was essential to more effective cooperation, and that the complete autonomy and independence of the stations in administrative and in scientific work, but with increased funds, would tend to make them more effective cooperating agents. Full confidence was expressed that a way would be found to prevent any apparent antagonism or duplication.

The following resolution, introduced by W. H. Jordan on behalf of the executive committee, was adopted after debate:

Resolved. That this association emphatically recognizes the great services which the National Department of Agriculture is now rendering to the science and practice of agriculture, and to the institutions here represented, by its helpful cooperation with the agricultural experiment stations and by its able coordination and wide dissemination of the information secured within itself and by the experiment stations; and this association views with disfavor any movements which, either by legislation or otherwise, shall tend to disturb or lessen the mutually advantageous relations which now exist between the Department of Agriculture and the experiment stations of the several States.

Resolved. That this association is firmly of the opinion that the continuation and development of these mutually helpful relations between the Department and the stations and the maintenance and progress of efficient research in agricultural science demand that the autonomy and paramount position of the

stations as institutions of research and experimentation be inviolably maintained within their respective States, in accordance with the terms and spirit of the Hatch Act.

Resolved, That in order that Congress may be properly informed as to the work of the agricultural experiment stations and its great value to agricultural practice, and to promote satisfactory relations between the Department of Agriculture and the experiment stations, the executive committee of this association is hereby instructed to request a hearing before the proper committees of Congress for the purpose of presenting the work and claims of the agricultural experiment stations, and to continue conferences with the honorable Secretary of Agriculture relative to cooperation between his Department and the stations.

GRADUATE STUDY.

L. H. Bailey, of New York, reported for the committee on this subject, as follows:

The committee on graduate work has had two meetings here to discuss the question of the graduate school of agriculture, such a school as was held two or three years ago at the Ohio State University. The whole question has been discussed as to whether it was good policy to continue such a school; and if so, under what conditions. It has seemed to the committee that it is desirable to continue the school under the auspices of this association. It has seemed also that those who conduct these schools should not bear the whole expense. It is suggested, therefore, that some means be provided whereby the different colleges in the country should be requested to contribute a small sum each year to aid in the maintenance of these graduate schools of agriculture. This can be justified from the point of view that this graduate school of agriculture, held every two or three years, as the case may be, affords an opportunity for each contributing college to give its men opportunity for advanced work which they do not have in any other way. It would seem, therefore, that it would be a good policy for the institutions to help to maintain a graduate school, in order that their men may have an opportunity to come in contact with other men. The second part of the attitude of the committee is, I think, equally important—that is, that there should be some place in the country where our workers meet other workers. This association has come more and more to be a delegate association. Every one of us would like to have our chemists meet other chemists, and so with the botanists, horticulturists, and other scientists. The committee therefore recommends the following:

(1) That this association reaffirm its conviction that a graduate school of agriculture is a desirable enterprise to be conducted in the summer at different colleges of agriculture in rotation.

(2) That this school be held every two years, beginning, if possible, with this coming summer.

(3) That each agricultural college be requested to contribute a small sum annually—say \$25—to aid in the maintenance of such school.

(4) That the committee on graduate study be empowered to determine where such schools shall be held.

(5) That it is the judgment of this association, while not desiring to limit the expenditures to any specified sum, that such schools of agriculture be conducted with the least possible expense consistent with the character of the work.

The report was adopted.

It was suggested that the committee prepare a circular of information regarding the school, to be sent to the different institutions interested.

MILITARY INSTRUCTION.

C. R. Van Hise, of Wisconsin, offered the following:

The chief purposes of the agricultural and mechanical colleges are indicated by their name. It is the clear intent of the Morrill Act that military work be subordinate to these purposes: Therefore, be it

Resolved by the Association of American Agricultural Colleges and Experiment Stations, that it is unwise to require military drill from each student more than two times per week during two years; and

Resolved, That the executive committee be instructed to present the views of

the association in reference to Order 65 to the Secretary of War, or if it seems preferable to the executive committee, that they be authorized to appoint a special committee for this purpose.

The resolution was referred to the section on college work and administration (see p. 91).

RESOLUTION REGARDING HON. H. C. ADAMS.

W. A. Henry, of Wisconsin, introduced the following resolution:

Resolved, That the Association of American Agricultural Colleges and Experiment Stations, in convention assembled, tender to the Hon. H. C. Adams, of Madison, Wis., its hearty thanks for his earnest, intelligent, and well-directed efforts in the last session of Congress to secure increased support for and to strengthen agricultural research in the various experiment stations of this country.

Resolved, That we hereby pledge him our hearty cooperation and assistance in his continued efforts to this end.

Resolved, That the secretary be instructed to send a copy of these resolutions by telegraph and this be followed by a copy transmitted by mail, and that a copy of these resolutions be entered in the records of this association.

Referred to the executive committee, reported favorably, and adopted.

EXTENSION OF FRANKING PRIVILEGE.

E. Davenport, of Illinois, offered the following resolution:

Resolved, That it is the sense of this association that engineering experiment stations established in connection with land-grant colleges should enjoy the franking privilege for their publications as well as do the agricultural experiment stations for theirs.

Resolved further, That the executive committee be instructed to institute measures calculated to secure this privilege.

A similar resolution regarding publications of extension work departments of land-grant colleges was introduced by K. L. Butterfield, of Rhode Island. Both resolutions were referred to the executive committee, reported without recommendation, and after debate withdrawn by the movers.

On motion, the association adjourned to meet at 8 o'clock p. m.

EVENING SESSION, WEDNESDAY, NOVEMBER 2, 1904.

The convention was called to order by the president, W. O. Thompson.

H. C. WHITE. The executive committee is informed and hereby announces that the section on college work and administration has given its assent to the resolutions passed this morning concerning the relations of the Department of Agriculture to the experiment stations (see p. 62), and also to the resolution offered by Director Armsby directing the executive committee to continue its efforts in relation to the experiment station bill and the mining school bill (see p. 43).

RESOLUTION REGARDING HON. F. W. MONDELL.

J. K. Patterson, of Kentucky, offered the following resolution, which was reported favorably by the executive committee and adopted:

Resolved, That the Association of American Agricultural Colleges and Experiment Stations, in convention assembled, extends to Hon. Frank W. Mondell, of Wyoming, its hearty thanks for his able, wise, and energetic efforts in connection with his bill pending for the establishment and maintenance of schools or departments of mines and mining in connection with the land-grant colleges and other institutions, introduced by him and now pending in the Fifty-eighth Congress. This association is sincerely appreciative of the great service in the cause of industrial education thus rendered by Mr. Mondell, and pledges him its cordial support and assistance in his continued efforts in this direction.

Resolved. That these resolutions be entered on the records of this meeting and a copy be transmitted immediately to Mr. Mondell.

RESOLUTION REGARDING MAJ. HENRY E. ALVORD.

For the committee on resolutions concerning the late Henry E. Alvord, J. K. Patterson, the chairman, presented the following:

This association has heard with profound regret of the death of Maj. Henry E. Alvord. He had not reached the average limit of human life, and many years of usefulness seemed yet to lie before him when the end suddenly came. But within the limits of the life allotted to him he had accomplished more than many of his contemporaries.

Springing from a hardy New England stock, endowed with a vigorous physical constitution and an active mind, his education was liberal as well as practical, and his opportunities were well improved. Leaving the employment of a civil engineer, in which he doubtless would have earned distinction, he offered his services ere he had attained his majority to the Government at the beginning of the civil war, entering as a private at its commencement, and advancing to the rank of major before its close. Promoted into the Regular Army because of the effective service which he had rendered as an officer of volunteers, he served in that branch of the service until 1872, resigning with the rank of captain.

As special Indian commissioner, as manager of the Houghton farm, as secretary of the American Jersey Cattle Club, as professor of agriculture in the Massachusetts Agricultural College and in New Hampshire College of Agriculture and Mechanic Arts, as president of the Agricultural College of Maryland, as president of the Oklahoma Agricultural and Mechanical College, as president of this association, and as chief of the Dairy Division in the Department of Agriculture, he identified himself with the progress of scientific agriculture in America to a degree above and beyond most men of his time.

But it is as one of the founders and one of the members of this association that we knew him so intimately and so long. To his remarkable power of initiative, his happy appreciation of opportunities, and his singular forecast of the possibilities of an organization such as this, its origin and success are largely due. His intimate relations with members of Congress and his acquaintance with legislative procedure in committee and on the floors of the Senate and House were of incalculable value in its inception and in its growth. The impress of his masterly hand remains upon this association to this day. During the progress of the Hatch Act through Congress in 1887 and of the Morrill bill in 1890, his activity was indefatigable.

This association therefore desires to place on record its high estimate of his ability, his integrity, his knowledge of men, his great powers of organization, his singular fidelity to his cherished ideals, his intelligent directive powers, his great common sense, and his uniform courage and courtesy in maintaining his views of public policy.

A sincere friend, a patriot, a soldier without sectional bitterness or prejudice, an efficient administrative, and a wise counselor, with a lofty ideal of duty and of honor, this association discharges a duty to itself by bearing hearty testimony to his conspicuous worth as a citizen and as a man.

Resolved. That a copy of this paper be incorporated in the record of this association, and a copy be sent by the secretary with assurance of sympathy and condolence to the family of the deceased.

JAMES K. PATTERSON,
H. P. ARMSBY,
W. A. HENRY.

Committee.

On motion of President W. E. Stone, of Indiana, seconded by President J. C. Hardy, of Mississippi, the resolutions were unanimously adopted by rising vote.

ELECTION OF OFFICERS.

M. A. Scovell, of Kentucky, reported that the section on experiment station work nominated to the convention for chairman of that section H. J. Patterson, of Maryland, and for secretary M. A. Scovell, of Kentucky.

W. E. Stone reported for the section on college work and administration that that section nominated as chairman R. W. Stimson, of Connecticut, and as secretary K. L. Butterfield, of Rhode Island.

On motion, these reports were adopted.

Mr. Scovell reported as members of the executive committee named by the section on experiment station work W. H. Jordan, of New York, and C. F. Curtiss, of Iowa, and as members of the programme committee M. A. Scovell, J. F. Duggar, and C. D. Woods.

Mr. Stone reported as members of the executive committee from the section on college work and administration H. C. White, of Georgia, J. L. Snyder, of Michigan, and L. H. Bailey, of New York.

On nomination of J. K. Patterson, of Kentucky, seconded by W. M. Liggett, of Minnesota, E. B. Voorhees, of New Jersey, was unanimously elected president of the association for the ensuing year.

By vote of the association the secretary was instructed to cast the ballot of the convention for other officers, who were declared elected, as follows:

First vice-president, J. C. Hardy, of Mississippi, nominated by J. L. Snyder, of Michigan; second vice-president, K. L. Butterfield, of Rhode Island, nominated by H. C. White, of Georgia; third vice-president, C. D. Woods, of Maine, nominated by W. M. Liggett, of Minnesota; fourth vice-president, E. R. Nichols, of Kansas, nominated by J. H. Worst, of North Dakota; fifth vice-president, E. Davenport, of Illinois, nominated by M. A. Scovell, of Kentucky; bibliographer, A. C. True, of the Office of Experiment Stations, nominated by C. D. Woods, of Maine; secretary and treasurer, J. L. Hills, of Vermont, nominated by H. J. Wheeler, of Rhode Island.

MEETING PLACE OF NEXT CONVENTION.

E. A. Bryan, of Washington, at the request of President Campbell, of the State University of Oregon, and on behalf of the State of Oregon and the entire Northwest, presented an invitation to the association to hold its next convention at Portland during the Lewis and Clark Exposition.

J. L. Snyder, of Michigan, gave notice that the association would be expected to hold its convention in 1907 at the Michigan Agricultural College, to celebrate the fiftieth anniversary of the establishment of the college.

The session adjourned until 9 o'clock next morning.

MORNING SESSION, THURSDAY, NOVEMBER 3, 1904.

The meeting was called to order at 9 o'clock a. m. by the president.

RURAL ENGINEERING.

W. E. Stone, for the committee on rural engineering, presented the following report:

Since the last meeting of the Association of Agricultural Colleges and Experiment Stations, considerable progress has been made in the agricultural colleges in developing courses under the various names of agricultural engineering, rural engineering, and farm mechanics.

The agricultural colleges of Minnesota, Wisconsin, Illinois, North Dakota, Indiana, New York, Colorado, California, Kansas, Wyoming, and Iowa are now offering instruction to the agricultural students in the subject under one or the other of the above names. Minnesota has completed an inexpensive building which is devoted to the teaching of farm mechanics. Wisconsin has a large building under construction, which is to be used for the same purpose. The agricultural college at Cornell, N. Y., is planning a large and commodious structure to be devoted to agricultural engineering. Illinois has made considerable progress in its farm mechanics course. During the last year the

four-story fireproof farm mechanics building at the Iowa Agricultural College has been completed, which, with its equipment, cost over \$75,000, and a good course in farm mechanics is offered in the college curriculum. In this course during the spring term 125 students were enrolled.

In the Department of Agriculture progress has been made by adding the department of drainage to the work of the department of irrigation investigation and changing the title to irrigation and drainage investigations.

It is to be regretted that a complete bureau of "Irrigation and Agricultural Engineering" has not been established, which was last year suggested by the committee and recommended by the Secretary of Agriculture. The agricultural colleges that have established courses in farm mechanics have found that great interest is manifested in the work of studying the principles of construction and testing of farm implements. This is true not only of the students and the farmers, but also of the manufacturers of these farm implements, who realize the importance of this work and are offering friendly cooperation and assistance to the work.

An example of what may be accomplished for the benefit of not only the farmers but the manufacturers will illustrate the value of studying farm machinery in colleges. The farm mechanics department of the Iowa State College undertook last year to test various makes of corn planters to note the accuracy of dropping the corn. It was found that there was considerable difference between the different makes and types of planters as to their accuracy of drop. The attention of the manufacturers was called to this fact, and while they were at first thoroughly convinced that their planters were accurate in their work yet they found there was room for improvement, and two firms acknowledged that they improved the accuracy of drop of their planters 20 per cent after their attention had been called to the defects of the planters and a remedy suggested. By means of this cooperation with the manufacturers the farmers of the country are greatly benefited.

While the implement manufacturers of the country are no doubt seeking to bring out the best possible farm implements, yet their interests are from a purely business motive. The department of farm mechanics at the various colleges of agriculture and the Department of Agriculture can do much to further the improvement of farm machinery by making impartial tests and report on the defects to manufacturers. There is at the present time a great demand for information on the cost and efficiency of pumping machinery for irrigation purposes. The large projects of irrigation now under way in the Western States require the pumping of large quantities of water to be lifted from 10 to 200 feet. Thousands of acres of land on the Missouri slope in North and South Dakota can be irrigated if the water can be pumped from the Missouri River cheap enough. Fuel is plenty in those sections of the country in the shape of lignite coal. The Department of Agriculture is performing a service of great value to the Western States by making experiments and collecting facts which will give information to settlers upon the best kind of pumping stations to install to supply the water for irrigation purposes.

During the last couple of years Germany, the Scandinavian countries, and Holland have issued several bulletins which give very interesting data upon tests made of domestic as well as American made farm implements. These bulletins are of great value to those countries, giving as they do the cost of various implements, the amount of work that can be accomplished, and efficiency with which the different makes do the work. Germany has long recognized the value of agricultural and mechanical training both for the farm and for the factory. Our own manufacturers are anxious to obtain graduates from our agricultural colleges who have a knowledge of the requirements of agriculture, together with a mechanical training in the designing of farm implements. Several positions are now open for young men with training along these lines.

There are so many and varied subjects embraced in agricultural engineering that the subject is entitled to a more prominent rank than it now holds in our agricultural colleges. It ought to hold equal rank with the departments of dairying, animal husbandry, agronomy, and horticulture.

It is exceedingly important at this time that the Department of Agriculture take steps to organize a bureau or division of agricultural engineering, in order to aid the colleges which now have a course of agricultural engineering established and to collect the data which such colleges are obtaining in their experimental tests for publication and distribution among the farmers, also to carry

on original research and to establish laboratories for practical tests of implements, a museum for farm implements.

The committee again recommends that the association declare itself in favor of the creation of separate departments of agricultural engineering in the colleges; that special efforts be made to assist the Secretary of Agriculture in his endeavor to extend the work along these lines, and that the executive committee use all means in its power to urge upon Congress the importance of this work and to convince them of the necessity of giving the Department liberal appropriations for these purposes.

W. E. STONE, *Chairman*.

W. A. HENRY, of Wisconsin. I desire to call the attention of educators along agricultural lines to the great importance and possibility of agricultural engineering. In Wisconsin we have begun to develop these lines and have created a department. I find a large correspondence from the farmer turning into that department already, and we find students turning into the department. We have two students who have elected farm engineering as their major study. The construction of our farm buildings, their adaptation to the purposes required, the proper uses of machinery, the drainage of lands, are all to be considered. You will find, I think, that a department of rural engineering will be a popular one in your college. Let us put in agricultural engineering and be in touch with our farmers. When a farmer wants to make improvements on his farm he will come to the college to get plans, and it should be prepared to furnish them. I believe this to be a very practical means of helping our farmers.

F. M. TISDEL, of Wyoming. I want to state that last year we established at the University of Wyoming a four years' course in irrigation engineering, and it is going to be one of the most important and useful courses in the college.

The report was accepted.

ANIMAL AND PLANT BREEDING—AMERICAN BREEDERS' ASSOCIATION.

W. M. Hays, chairman of the committee on this subject, presented the following report:

Your committee on plant and animal breeding accepted the invitation of the American Association for the Advancement of Science, and called a meeting during convocation week in St. Louis, December 29 and 30, 1903, to organize an association. At a meeting of this committee held December 28 a form of constitution and by-laws was prepared by your committee suggesting a plan of organization. Prof. C. F. Curtiss was chosen president and W. M. Hays secretary of the preliminary organization. Over fifty were in active attendance at the meeting, and after full consideration and amendment, the proposed articles were adopted as the organic law, and an organization was effected under the name of the American Breeders' Association. A printed copy of the minutes is submitted herewith.

The plan of organization, like that of the parent organization, consists of a general organization and two subordinate organizations, the one devoted to plants and the other to animals.

The following officers were chosen:

President, Hon. James Wilson, Washington, D. C.; vice-president, Hon. L. H. Kerrick, Bloomington, Ill.; secretary, Prof. W. M. Hays, St. Anthony Park, Minn.; treasurer, Prof. Oscar Erf, Manhattan, Kans.

Animal section: Chairman, Hon. John Dryden, Toronto, Canada; secretary, Prof. F. B. Mumford, Columbia, Mo.

Plant section: Chairman, Dr. H. J. Webber, Washington, D. C.; secretary, Prof. N. E. Hansen, Brookings, S. Dak.

This new organization, not having had a meeting since its organization, has not yet had the opportunity to appropriately recognize its obligations to the parent organization nor its future relations thereto.

The fees for annual membership are, for North America, \$1; outside of North America, \$2; life membership, \$20, with a twenty-five year limit on the membership of societies and libraries; patronships, \$1,000. Honorary memberships are provided for, and Luther Burbank was given the honor of being the only life member chosen at the first meeting.

A membership committee was appointed, consisting of a general chairman, Mr. E. D. Funk, of Bloomington, Ill., and a chairman and subcommitteemen for each State and province of North America.

The present membership, including a number of European and Asiatic persons and organizations, numbers about 275, of which 15 are life members. The expenses incident to the first meeting and the printing and postage and clerk hire necessary in connection with securing members have required practically all the receipts from annual memberships. Since only the proceeds from annual memberships and the interest income from life membership investments are available for the payment of current expenses, the association is practically without funds with which to publish its first annual report.

The plan adopted for securing memberships has not proven either convenient or effective, and this work is being somewhat more closely centered in the secretary's office, with the chairman and members of the membership committees and others who volunteer to assist in securing members operating through that agency. A card index provides a way of keeping account with each person, society, or institution to whom an invitation to join is sent, and it is proposed that those who should join shall be repeatedly solicited, that a positive or a negative answer may be secured. The multiplicity of organizations to which breeders and scientists belong makes it difficult to secure members.

The association has to offer as inducements to persons to become members, besides the privileges and responsibilities of its annual meetings, an annual report, a business or professional card in the directory in the annual report, the good offices of the association in having the U. S. Department of Agriculture and the experiment stations send to its members such public documents as the directory cards may show that the members are respectively interested in. No doubt other advantageous features will be developed.

The association is determined that a large membership shall be secured. It is in need of help to gain a sufficient number of annual and life memberships so that it will be recognized as having been fairly launched as a strong, conservative, and permanent association. It is also in immediate need of sufficient financial aid to publish its first annual report, for which there is an abundance of excellent material.

W. M. HAYS,
L. H. BAILEY,
C. F. CURTISS,
H. J. WEBBER,
THOS. F. HUNT,
Committee.

The report was accepted and the committee was continued for another year.

MILITARY INSTRUCTION.

The following resolution adopted by the section on college work and administration was presented and adopted (see p. 63) :

Resolved, That the executive committee be instructed to present the views of the association in reference to military tactics to the President of the United States or to the Secretary of War, or both; or, if it seems preferable to the executive committee, that they be authorized to appoint a special committee for this purpose.

THE UPBUILDING OF AGRICULTURE.

W. Saunders, Director of Canadian Experimental Farms, read the following paper on this subject :

It is not my purpose on this occasion to dwell on the history of the progress of agriculture from early times, but to call attention to some points in connection with the marvelous progress which has been made in the United States and Canada in the knowledge and practice of agriculture within a comparatively recent period.

Agricultural progress in the United States was greatly influenced by the passing of the land-grant act in 1861, by which, through the liberality of Congress, provision was made for the endowment of a college of agriculture and mechanic arts in every State of the Union. The grant was a generous one—30,000 acres for each Senator and Representative in Congress to which such State was

entitled at the time the act was passed. It provided that the whole of the money received from the sale of these lands should be invested in safe securities and the interest only used for the maintenance of the college referred to.

The individual States were required to furnish the necessary land and buildings for these institutions, so that the money received from the land granted might be preserved in full as a permanent and substantial endowment fund to be used only for maintenance purposes. Nine million six hundred thousand acres of public lands were thus appropriated, from which a large fund has accumulated.

During the next few years a college of agriculture and mechanic arts was established in accordance with the provisions of the land-grant act in nearly every State in the Union, the land and buildings being furnished by the State or by the liberality of the cities or towns in or near which these institutions were located. In many instances there was associated with the teaching college an experimental farm, where many useful lines of work were conducted. Experiments were carried on in connection with dairying and in the feeding of cattle, sheep, and swine; to test the usefulness of different fertilizers when applied to crops, and to ascertain the relative value of many varieties of grain, grasses, and other fodder crops. Varieties of fruits and vegetables were also tested with the object of finding out in each case the most profitable sorts for the farmers to grow.

After some years of experience it was found that a teaching staff could not satisfactorily discharge its duties to the students and at the same time carry on experimental work with the care and thoroughness which its importance demanded. The teaching was imperative, as the students were gathered primarily for instruction. The experimental work was taken up as opportunity offered, and under such conditions satisfactory progress could seldom be made. At the same time the importance of experimental work pressed on the minds of those who realized how much might thus be done to help the working farmer. Then separate experiment stations began to be organized whose officers were to give their whole time and attention to this work, and the advantages attending this course were soon manifest. Public opinion favored the extension of such work, and in 1887 the Hatch bill was passed by the United States Congress, which, by a liberal yearly grant from the Federal Treasury, provided for the support of a well-organized experiment station in each State and Territory in the Union.

These stations were rapidly organized, and with the further aid of State appropriations were soon actively engaged in many useful lines of experiments bearing on the upbuilding of agriculture. During the seventeen years which have since passed a vast fund of useful information has been accumulated and given to the farming public in reports and bulletins, and the practice of agriculture has thus been assisted in every direction. With a small army of workers engaged in the attempt to solve the various problems which prove a hindrance to the farmer, progress has been rapid, and in every line of agricultural work, conducted under all the varying conditions of climate found in this country, patient investigators have made numerous experiments with the laudable object of finding out how the practice of farmers might be improved and the profits of their business increased. Toward this end the teaching colleges have also lent their influence and aid. The country may well feel proud of these excellent institutions, which have been established on so permanent a basis, and the representatives of both these useful organizations, assembled here to confer together and to discuss matters bearing on the welfare of agriculture, should feel gratified at the high position to which experimental agriculture has attained in the United States.

It would be unpardonable were I to fail to refer to the great work which the Department of Agriculture at Washington has done to stimulate the progress of agriculture. Much of this work has been of a highly scientific character and much of it thoroughly practical. The liberality which the country has shown in the increase of appropriations made for this purpose is remarkable, and, as far as I know, without a parallel. The sum appropriated in 1886 for defraying all the expenses connected with all branches of the work carried on by the Department was \$408,810, while in 1903 it amounted to the enormous sum of \$5,013,960. In the meantime the number of officers in the main divisions of the work has been largely increased and the divisions subdivided. Many new lines of work have been taken up and investigations conducted in nearly every part of the United States and its colonies.

In Canada also some progress has been made in the upbuilding of agriculture. Twenty years ago agriculture was in a very depressed condition in Canada and much concern thereby awakened. The importance of a prosperous condition of agriculture there is difficult to overestimate when we consider that about one-half of the population are engaged in agricultural pursuits and that agriculture is the mainstay of all other industries. In 1884 the House of Commons appointed a select committee to inquire into the best means of developing and encouraging the agricultural interests of Canada. This committee made a careful inquiry into the subject, also as to the disadvantages and wants experienced by farmers, taking evidence from various persons who had made a special study of the different branches of industry included under the general term agriculture, and of others having a scientific knowledge bearing on this subject. In the report subsequently submitted to the House of Commons the substance of the evidence accumulated is thus summarized:

"Notwithstanding the great progress made in recent years, it appears that there is a large amount of defective farming in this country. In the cultivation of cereals, roots, and grasses there is want of periodical change of seed, selection of improved varieties, a proper rotation of crops, with a lack of thorough tillage and a knowledge of the value and suitability of manures. The value of manures is in many cases unheeded, and much fertilizing power is lost through negligent exposure and the waste of liquid manures. In stock raising the chief deficiencies are the want of pure-bred males, lack of knowledge of the adaptability of breeds to particular conditions throughout the Dominion, the want of better pasture and more abundant tree shelter. In the production of butter the milk is frequently not properly cared for, nor is suitable attention paid to the selection of milch cows, and the food given is often deficient in nutriment and in milk-producing qualities.

"Low grades of butter are attributable to want of skill in its manufacture and want of improved apparatus. In cheese making the need of greater skill and want of scientific knowledge is also felt. In the cultivation of fruit a great want is experienced in many sections of hardier varieties and of varieties with improved keeping qualities. There is also a deplorable want of knowledge regarding the insects and diseases injurious to fruit trees."

Careful investigation led to the conclusion that the lack of success was not due to any fault in the soil or climate of this country nor to a want of industry among the farmers, but to defective farming, to want of skill and knowledge in all departments which the farmer of himself was scarcely able to remedy.

The committee recommended that the Government establish an experimental farm or farms where experiments might be carried on in connection with all branches of agriculture and horticulture, and that the results of the work conducted should be published from time to time and distributed freely among the farmers of the Dominion.

The recommendations of this committee were acted on. Information was first obtained regarding experimental stations then in operation in Europe and America and the methods pursued by them in their efforts to gain information valuable to the farmer and early in 1886 an act was introduced and passed almost unanimously, authorizing the Government to establish a central experimental farm and four branch farms. The central farm was to be located at or near the capital, Ottawa, where it was to serve the purposes of the two larger provinces, Ontario and Quebec. The branch farms were to be distributed as follows:

One for the three maritime provinces jointly, Nova Scotia, New Brunswick, and Prince Edward Island; one for the province of Manitoba; one for the Northwest Territories, and one for British Columbia. The work to be undertaken at these several experimental farms was set forth in the act and covered all lines of experiments relating to agriculture, horticulture, and arboriculture.

Within two years the land for the several farms was secured, the necessary officers appointed, most of the buildings erected, and the farms put in practical operation. The central farm was located near Ottawa, the branch farm for the three eastern provinces at Nappan, Nova Scotia; that for Manitoba at Brandon; the farm for the Northwest Territories at Indian Head, in Assiniboia, and that for British Columbia at Agassiz, in the coast climate of that province.

In the choosing of these sites the purpose in view was to have them fairly representative of the larger settled areas in the provinces or territories in which they were placed both as to soil and climate. In the arrangement of the work such experiments as were most likely to be beneficial to the larger number of

settlers were in each case among the first to engage the attention of the officers in charge.

Eighteen years have passed since this work was begun, and during that time agriculture in Canada has made unprecedented advancement. It is not claimed that this progress has been wholly due to the influence and work of the Dominion Experimental Farms; much credit is justly due to the various measures carried on by other useful organizations established mainly by the several provinces.

Foremost among these is the Ontario College of Agriculture at Guelph. This is a well-equipped institution which has done noble work. Farmers' institutes, live-stock associations, fruit growers' associations, and agricultural and horticultural societies have all proved helpers in this good cause. The commissioner's branch of the Dominion department of agriculture has also been an important factor. This branch deals with the cooperative dairy interests, the development of cold-storage facilities by which certain food products can be carried in good condition to the markets in Great Britain, the inspection of fruits, seeds, etc. There is, however, no doubt that the experimental farms established by the Federal Government have contributed in large measure to the general upbuilding of agriculture in Canada. The progress referred to has resulted in a general improvement in the condition of the agricultural population all over the country and in a vast increase in the exports of agricultural products.

There is probably no employment which engages man's attention that requires more skill and more general information than farming. Competition is keen throughout the civilized world, and the farmer must turn to practical account every advantage within his reach bearing on improvement in the quality of his products and in lessening the cost of their production, if he is to maintain and improve his position.

Investigations and experimental research have been conducted on almost every line bearing on agriculture, and a great mass of important facts has been accumulated and given to the farming community in reports and bulletins.

When the experimental farms were planned it was intended that they should become bureaus of information to which farmers could apply from time to time to aid them in the solution of difficulties which frequently present themselves during the progress of farm work. Evidence of their usefulness in this way is furnished in the rapid increase of correspondence carried on with farmers in all parts of the Dominion. In 1889, the year after the farms had become fairly organized, the number of letters received was about 8,000. During the past six years the average number annually received at all the experimental farms was 66,222. In addition, over 220,000 reports and bulletins have been sent each year. There is thus a constant flow of information going to Canadian farmers from all the experimental farms.

It is as a rule a difficult matter to bring about rapid changes in the ideas and practice of farmers, but as soon as they are convinced that experimental work is carried on in a practical manner by persons competent to give information, that it is undertaken in their interest and with the special object of making farming more profitable, their sympathy and cooperation are assured.

Experimental agriculture covers so large a field that I can but briefly refer on this occasion to a few important points in connection with the work which has been done for the upbuilding of agriculture in Canada, such as will indicate the general trend of the work.

The principles which underlie successful crop growing may be thus summarized: Maintaining the fertility of the land, adopting a judicious rotation of crops, following the best methods of preparing the land, early sowing, choosing the best and most productive varieties, and the selection of plump and well-ripened seed. Along all these lines many experiments have been conducted.

Continued efforts have been made to gain knowledge as to the best methods of maintaining and adding to the fertility of the land. In this connection special attention has been given to investigations to determine the best methods of handling and using barnyard manure—the universal fertilizer, which is more or less available everywhere to the farmer.

Experiments continued for eleven successive years have shown that a given weight of manure taken fresh from the barnyard is equal in crop-producing power to the same weight of rotted manure. It has also been shown by repeated tests that fresh manure loses during the process of rotting from 50 to 60 per cent of its weight. The effective use of barnyard manure so as to obtain the best results with the least waste is without doubt one of the most important problems connected with successful agriculture, for on this material the farmer's

hopes of maintaining the fertility of his land and thus providing for a succession of good crops are mainly based. It is estimated that the manure produced in the solids and liquids of animals in the United States will probably amount to about 1,000 million tons annually, and that in Canada to about 100 million tons. The financial loss involved in the wasteful handling of such a vast amount of valuable material should impress us all with the importance of this subject.

Tests for eleven years were also carried on with artificial manures to gain information as to their relative value when used separately or in combination on nearly all the more important farm crops. The results had from artificial fertilizers used alone have been disappointing, considering the large proportion of available plant food they contain. The reason for this lies probably in the fact that these fertilizers contain no humus and that the proportion of vegetable matter in the soil has been much reduced by constant cropping and the capacity of the soil for holding moisture lessened, to the detriment of its crop-producing power.

The plowing under of clover has been most effective as an additional source of fertility. It increases the store of available plant food by the addition of nitrogen obtained directly from the atmosphere. It also adds to the mineral plant foods available by gathering these from depths not reached by the shallower root systems of other farm crops. It also serves as a catch crop during the autumn months, retaining fertilizing material brought down by the rain, much of which would otherwise be lost. It also supplies the soil with a large addition of humus whereby the land is made more retentive of moisture, and results in a deepening and mellowing of the soil.

In a series of 14 plats of oats, covering a period of five years, where clover was sown and plowed under on alternate plats, the plats with clover gave an average increased yield of grain of about 9 bushels. In a similar series of plats of barley where grown after clover there was an average gain of 8 bushels and 31 pounds per acre. In all these plats there was also a considerable increase in the weight of straw produced. Proportionate gains have also been made in trials with Indian corn and potatoes. Many other examples might be given.

In preparing land for crops different methods are adopted in different parts of the Dominion. In the eastern provinces the fall plowing of land is now generally followed, as crops can be sown earlier by the adoption of this method. On the Northwest plains it has been found of great advantage to summer-fallow a part of the land each year. This practice conserves moisture, destroys weeds, and brings the farmer much larger crops. The yield of wheat on land which has been summer-fallowed will average fully one-third more than it will on land which has been prepared by fall or spring plowing.

That increased crops result from early sowing has been fully demonstrated by the tests carried on at the central farm. Experiments with early, medium, and late sowings were conducted for ten years on plats of one-tenth acre each, sowing two varieties each year of wheat, barley, oats, and peas. The land was very uniform and all similarly prepared. Six sowings were made in each case, the first at the earliest time practicable, the second at the end of a week, and others at the end of each subsequent week until six successive sowings had been made. These plats were all harvested and thrashed separately and the results recorded. The best crops have been had from the second sowings, made just one week after it was possible to get on the land; beyond this delay has resulted in loss, which has become more serious as the delay has been greater. The average of the ten years' experiments shows that with wheat a delay of one week after the period named has entailed a loss of over 30 per cent, two weeks 40 per cent, three weeks nearly 50 per cent, and four weeks 56 per cent of the crop.

With oats a delay of one week has caused a loss of over 15 per cent, two weeks 22 per cent, three weeks 32 per cent, and four weeks 48 per cent.

In the case of barley a delay of one week has resulted in a loss of 23 per cent, two weeks 27 per cent, three weeks 40 per cent, and four weeks 46 per cent.

With peas a delay of one week has caused a loss of 4 per cent, two weeks 12 per cent, three weeks 22 per cent, and four weeks 30 per cent.

The results of these experiments have been widely published and farmers in the East now pay general attention to early sowing.

Another important consideration in connection with successful farming is the selection of the best varieties of seed for sowing, taking into consideration

productiveness, quality, and earliness of maturing. That there are varieties more productive and earlier in ripening than others has been abundantly proven.

During a five years' test of 41 varieties of oats, all of them sown each year on the same day and on adjoining plats, the results have shown the relative productiveness of certain sorts. Each year a list has been published of the heaviest-yielding 12 in the series, and during the whole period of five years only 15 of the 41 varieties have found their way into this select list, and 9 of these have appeared among the best 12 every year.

Similar evidence has been furnished with spring wheat, 31 varieties of which have been under trial for a like period. In this instance 16 of the 31 sorts have appeared among the best-yielding 12 during the five years' trial and 9 of these varieties have appeared each year in that list. The evidence as to persistent productiveness in certain varieties of barley is still more striking.

In the oat plats the difference in crop is large, ranging from 89 bushels to 42 bushels. Spring wheat has ranged from 31 to 16 bushels, barley from 58 to 33 bushels, and peas from 46 to 20 bushels.

The importance of growing those varieties which will give the largest crops is manifest when we consider the very large areas under cultivation. Taking the acreage in Canada alone devoted to the oat crop, which is very small compared with the United States, an increase there of a single bushel per acre to the average crop adds to the profits of Canadian farmers over a million of dollars.

But it may be asked, How can farmers procure these prolific strains of seed? The following is the method pursued in Canada: After careful and continued experiment has shown that any variety is specially productive and promising, this is cultivated on a larger scale so as to admit of the free distribution of samples among the farmers of the Dominion. This grain is grown chiefly at the branch experimental farms in the west and distributed from the central farm at Ottawa, where the samples can be sent free through the mail. They are sent out in strong cotton bags, the quantity of oats forwarded to each applicant being 4 pounds, and of wheat and barley 5 pounds, sufficient in each case to sow one-twentieth of an acre. These samples are sent only on personal application, and only one variety can be had by an applicant each year. Under this restriction the number of samples sent out during the past eight years has averaged 36,684, requiring about 70 tons of seed annually. Last year this distribution reached over 40,000 farmers, and the interest felt in it is steadily increasing.

Not only is the grain sent out of high quality, but it is also thoroughly clean. If a farmer takes reasonable care of the sample he receives, he can soon have sufficient seed to sow a large area for himself and have a surplus to sell to his neighbors. This may perhaps be best illustrated by two or three extracts from correspondents regarding oats, representing a large number of such letters received. Similar testimony in regard to samples of wheat and barley could be given.

A farmer from Dauphin, Manitoba, writes: "The sample bag of 4 pounds of oats sent me two years ago gave me the first year 5 bushels. This year we sowed these on 2 acres, and we got 217 bushels."

A correspondent from Laurel, Ontario, says: "We got a sample of oats from you six years ago, and they gave us great satisfaction. The people about here think very highly of them, and there are thousands of bushels of them grown. The farmers are coming here for seed for 20 miles around."

Another farmer from Carleton Place, Ontario, says: "The oats I got from the experimental farm some years ago have been worth a great deal of money to me, in increased yield and increased price, as I have sold quite a quantity for seed."

Another farmer from Piedmont, Nova Scotia, writes: "The oats, of which a sample was received three years ago, proved an excellent variety. I had 420 bushels last year. They yielded 74 bushels to the acre."

It is thus apparent that with attention and care any farmer may soon provide himself under this liberal arrangement with the best and most productive strains of seed in sufficient quantities for a large area at no cost to himself beyond that of his own labor.

The recent increase observed in the yearly average of cereal crops in Canada, which is very considerable, is no doubt due in large measure to the more general cultivation of highly productive varieties brought about by these annual distributions.

Many varieties of grain have been brought to Canada for test from nearly all the grain-growing countries in the world. This has been done with the hope of finding varieties equal in quality and productiveness to the best of those now in cultivation and earlier in ripening. Some wheats have been brought from northern Russia and other northern parts of Europe; some from high altitudes in India; others from England, France, Germany, Hungary, the United States, Australia, and Japan. The wheats from northern Europe and from India have usually ripened in a shorter time than the Red Fife, which is one of the best sorts in general cultivation in Canada, but most of them have been inferior in quality and productiveness.

During the progress of these experiments many cross-bred wheats have been originated with the object of combining the good qualities of two or more varieties. In most of these crosses Red Fife has been used as one of the parents on account of its high quality and productive character.

One of the early introduced sorts from Russia was the Ladoga, which was, on an average, a week earlier than the Red Fife. This was unacceptable on account of the yellow color of the flour made from it, but it was crossed with the Red Fife and a number of new sorts produced. One of these, known as Preston, has exceeded the Red Fife in yield during a test of eight years by $1\frac{1}{2}$ bushels per acre, and has ripened on an average about four days earlier.

Another variety, known as Early Riga, was obtained by crossing one of the East Indian varieties procured from an elevation of 11,000 feet in the Himalayas with a Russian wheat brought from near Archangel, one of the most northerly wheat-growing districts in Russia. These were both early ripening sorts and were of good quality, but were not sufficiently productive. The Early Riga ripens about ten days earlier than the Red Fife or the Blue Stem, and is fully equal if not better in quality, but the yield, although good, is not quite so heavy.

These gains in earliness are of great importance in Canada, in view of the immense territory we have lying north of the present wheat fields. Such varieties will no doubt serve to materially extend the area of successful wheat growing. About 1,000 new varieties of wheat have been produced at the Canadian experimental farms in the manner indicated, and among these there are many promising sorts.

Experiments have been conducted for a series of years to ascertain the quantity of seed grain most profitable to sow per acre, the depth in the soil at which the seed should be placed in the different climates in the Dominion, and the relative advantages of sowing with different sorts of drills as compared with broadcast seeding.

The object lessons which have been given in the raising of fodder crops and the making of silage, thus providing cheap and succulent food for cattle during the winter, have greatly stimulated the dairy industry, especially the manufacture of butter in winter. The experiments carried on with reference to the care of milk and the economical production of butter of high quality have received much attention from those engaged in dairying. The experience gained in the economical feeding of cattle, swine, and sheep, and in testing those breeds best adapted to produce the highest quality of beef, pork, and mutton, has stimulated and aided the stock industries. The business in eggs and dressed fowls for the table has also been advanced by the publication of the results of experiments in the poultry branch.

The instructive tests which have been made with large and small fruits have served to show where these can be grown to the greatest advantage, and have been helpful in promoting fruit growing over those large areas in Canada where the climate is so well adapted to the growth of fruits of high quality.

Special efforts have been made to meet the difficulties which arise in the more northern districts where the better classes of existing fruits prove too tender. For such localities new sorts have been produced by the cross fertilizing of very hardy wild Siberian forms with some of the hardiest of our cultivated apples. It has been shown that such cross-bred fruits are hardy enough to endure the climate in all the settled parts of the Canadian northwest.

The information which has been given on the growing of vegetables and the varieties best suited to the different climates of the country has proved very helpful. Many practical experiments have been conducted in the growing of forest trees to furnish shelter for exposed situations. Large quantities of young trees and tree seeds have been distributed among farmers in those districts where trees are scarce. Some limited distribution has also been made of

ornamental trees and shrubs with the view of encouraging the adornment of homes and making them more attractive.

Much information has been given as to the best remedies for the destruction of noxious insects and for resisting the attacks of fungus diseases from which grain, fruit, and other crops suffer so much. The subject of noxious weeds has also been investigated and the best measures pointed out for their subjugation.

In the chemical division investigations have been conducted on many lines bearing on the agricultural interests of the country and the help thus rendered to farmers has been greatly appreciated.

Much of the practical information gained each year by the lines of experiments conducted is given to the farmers in the annual reports and bulletins issued. Many thousand farmers also visit the farms each year. The officers of all the farms also attend meetings of farmers held in different parts of the country, where opportunities are afforded for giving fuller explanations concerning all branches of the work in progress.

In the meantime the upbuilding of agriculture has progressed rapidly and the occupation of farming has been elevated in the eyes of the community. It is no longer looked upon as a drudgery where the dull and slow-going may eke out a laborious existence; it is now recognized as a suitable field for the exercise of the higher intelligence of more cultivated minds, as a calling requiring much skill to conduct it successfully.

While the demands of the home market for food products are immensely greater than they were twenty years ago, the export of farm products has greatly increased. In 1884 the total export of wheat and flour from Canada was about a million dollars; in 1903 it was over 29 millions. The export of cheese, which at that time was about 7 millions, has increased to over 24 millions. The export of pork, bacon, and hams has run up in the same time from about half a million to over 16 million dollars. The exports of fat cattle have more than doubled and large increases have been made in almost every other line.

There are still opportunities for improvement. Nowhere have we reached a stage approaching perfection, and I know of no pursuit more noble than that which is so fully represented at this convention, that of striving to add to the happiness of mankind by helping the tillers of the soil by precept and experiment to improve their condition, thus making the earth to yield more bountifully, producing food products in larger quantity and of better quality for sustaining the teeming millions now occupying the surface of our globe.

The programme committee for the college section not having been selected by that section the chairman and the secretary were authorized to fill the committee by the selection of one additional member to act with themselves.

On motion of E. B. Voorhees, of New Jersey, the annual dues of each college and station constituting the association were fixed at \$15 for the year 1904-5.

INDEXING AGRICULTURAL LITERATURE.

E. W. ALLEN, of the Department of Agriculture. In the report of the committee on indexing agricultural literature, which was read by Professor Hays (see p. 32), reference was made to the indexing of periodical literature relating to agricultural science. This work was undertaken at the instigation of the experiment stations, there having been considerable demand for an index to scientific literature not covered by any indexes we now have. The current work of the periodicals is, as you know, reviewed in the Experiment Station Record, and our indexes at the end of a year or end of the period cover that current work and make it easily accessible. In order that the looking up of work that has been done in the past on particular subjects might be simplified, Miss Clark, the Librarian of the Department, has undertaken, at the request of this committee, to prepare an index of the scientific periodicals published in Europe and in this country relating to agricultural science and has secured an additional appropriation from Congress in order that she might carry on this work with less interference. She has now assigned a regular cataloguer to the work and is going forward systematically. As the report referred to stated, arrangements have been made with the Library of Congress to print these cards. The printing

of the cards has been undertaken, and a circular has been sent out to the institutions announcing the index and the terms on which it can be subscribed for. These are very liberal, but a small fee is required because it is not the custom of the Library of Congress to give away its cards, believing people usually appreciate it more if they pay a small sum. The cards have been classified by subjects in such a way that a person who does not desire a complete set can get those relating to a particular topic. A person who is interested in a library on plant diseases can subscribe for all the cards on plant diseases, and so on. There has been considerable response to the circular sent out, but it has not been sufficiently general so that we feel warranted in concluding that it has come to the attention of the people as widely as it should.

C. F. Curtiss, of Iowa, stated to the convention that a special train had been provided to carry the members of the convention to Ames to visit the Iowa Agricultural College, and that all were invited to join in the trip.

RESOLUTION REGARDING DIRECTOR TRUE AND THE OFFICE OF EXPERIMENT STATIONS.

C. D. Woods, of Maine, offered the following:

It is with great regret that the association notes the absence of Director True of the Office of Experiment Stations from this convention, and the association hereby tenders him its appreciation of his untiring and successful endeavors in behalf of this association.

It also takes this opportunity to commend the various lines of work of the Office of Experiment Stations under his charge, and notes in illustration the work of the division of nutrition in its study of the nutritive value of the food of man as a line of work in cooperation with a number of the institutions here represented and of great practical as well as scientific importance which might, to public advantage, be extended.

The resolution was adopted.

RESOLUTIONS OF THANKS.

M. A. Seovell, of Kentucky, presented resolutions of thanks to those who had contributed to the success of the meeting, which were adopted.

On motion of H. C. White the thanks of the association were returned to Mr. Saunders for his interesting paper, and it was ordered that the address be made a part of the proceedings of the convention.

On motion of W. E. Stone, of Indiana, the thanks of the association were returned to the retiring president, W. O. Thompson.

On motion, the convention then adjourned sine die.

MINUTES OF THE SECTIONS.

SECTION ON COLLEGE WORK AND ADMINISTRATION.

AFTERNOON SESSION, TUESDAY, NOVEMBER 1, 1904.

The section was called to order at 2 p. m. by the chairman, W. E. Stone, of Indiana.

The following paper was presented by W. O. Thompson, of Ohio:

HOW FAR SHOULD OR MAY LAND-GRANT COLLEGES ENGAGE IN TEACHING ELEMENTARY SUBJECTS NOT GENERALLY RECOGNIZED AS BELONGING TO THE COLLEGE CURRICULUM?

The discussion of this topic involves an interpretation of the Morrill Act. I shall first give some attention to that phase of the discussion, and here let me remark:

I. The word "college" at the time of the Morrill Act signified an institution of higher learning for which certain prescribed academic studies were required as a condition of entrance and in which institutions there were certain studies chiefly prescribed which were pursued as a condition of a baccalaureate degree. From a practical point of view the word "college" was clear and distinct. We recognize that historical and traditional idea. When we come, however, to make application of this term, we are compelled to recognize also that a standard for entrance or basis on which the college was built was far from uniform. This variation was so great that the degrees of some colleges would require a little more than the entrance requirements of to-day. I make mention of this condition in order to make one other remark, namely, that the discussions in Congress could not, therefore, be interpreted as signifying an institution of such standard as would be beyond the prevailing conditions of the college at that time. It is true that this prevailing idea did not imply very much as to the grade of teaching or as to the method of teaching. It would be safe to assume that neither the method nor the standard would be regarded as satisfactory in the college of to-day. This leads me to say, therefore, that very little can be drawn from the word "college" as occurring in the statute. So far as the discussion in Congress might be regarded as influencing this decision, I should say that the word "college" could be interchanged with the word "school" and do no great violence to the conception prevalent at the time the Morrill Act was passed.

II. A further interpretation lies in the modifying phrase, "to teach such branches of learning as are related to agriculture and the mechanic arts."

It would seem from this statement that Congress made no effort to define the term "college," but rather to indicate in a general way the lines of work that were to be pursued and to be given special emphasis. The term "branches of learning as are related to agriculture and the mechanic arts" is a very broad and indefinite statement. It is noticeable that these branches are not even named. It is doubtful whether many in Congress could have named the subjects, even, or could have recognized them if they had been named. It is true that the discussions in Congress did emphasize the importance of maintaining

the fertility of the soil and improving the live stock of the country, but the various subjects now regarded as "related to agriculture" and as of the highest importance are quite beyond the conception in the mind of Congress. Indeed, we recognize that there has been a considerable development in the colleges themselves in the way of minute classification as well as in interpretation of subjects not then in the minds of the founders of these colleges. We are disposed, therefore, to assume that these men, looking at the subject in a broad and general way, were willing to leave it to the natural development that would come from the influence of such institutions when organized. This would assume that a higher grade of work than was contemplated at that time is probably done at this date. Our theme looks the other way and makes the inquiry whether a lower grade of work than would be recognized in our time as college work could be admissible as meeting the terms of the act.

I may add that the same remark could be applied with equal force concerning the subjects related to the mechanic arts. The one subject of electricity would be sufficient to illustrate that much work now being regarded as perfectly logical and exactly within the terms used in the statute, was at the same time entirely without the horizon of most men at the time the act was passed.

Further, it is noticeable that the statute provided that the subjects should be taught; that it neither makes nor suggests any idea as to the grade of instruction—that is, whether it shall be collegiate or preparatory—but that the emphasis is put clearly upon the teaching of these subjects. It is plainly upon the surface of the statute that these subjects were new subjects of study and instruction. The colleges that were to teach them were making a new departure, and were introducing the study of branches hitherto almost entirely neglected. It seems clear, therefore, that we may safely assume that the teaching of the subject meets the statute whether it be done in an elementary or in a more advanced way.

III. A further interpretation is suggested in the phrase, "in such a manner as the legislatures of the States may respectively prescribe." It is a matter of some importance to note that in the discussions of this bill and in the veto message of President Buchanan there was serious objection raised on the ground that education was a matter in which the local government should have supreme control. It was argued that a federal government had no right to interfere or to restrict in any way the rights and privileges of the States in the matter of education. This old argument is still used against the organization of a national university. It seems fair, therefore, to say that this phrase now under consideration left the whole question of the manner of teaching to the several States, and that it was an effort to avoid an unpleasant debate in Congress, which might have defeated the bill. Assuming this statement to be true, it seems entirely clear, therefore, that the several States must teach the subjects, and that the manner of the teaching is wholly a matter of local jurisdiction. This allows large liberty as bearing upon the question of elementary and advanced discussions. It assumes that each State knows how money can be expended most wisely within its borders in order to reach the general ends outlined in the statute. It would be assumed then, as it would be assumed now, that the conditions in the several States would vary, and that what was wise in one instance would not be in another. There is a substantial unity in these agricultural colleges, but there is no such thing as absolute uniformity. The statute is general in its statements, and wisely so. The chief problem is, therefore, to so interpret the statute that it may in the several localities do the thing desired, namely, teach certain subjects, and through instruction in these subjects awaken a new interest, perpetuate good conditions, and make way for improvement.

IV. We are interested in one other phrase: "In order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." The several terms in this phrase offer opportunity for a wide discussion, but attention is called to one or two features only.

(1) The expression "practical education" was evidently intended to supplement the word "liberal," which then had a very distinctive meaning. A liberal education was not then assumed to be a practical matter, as it now is. Most men now regard a liberal education as a thoroughly practical one. At that time a little different conception existed in the minds of most people. The expression "practical education," therefore, was supplementary, and suggested in a broad way that new subjects were to be introduced into these colleges and a new emphasis put upon the importance of a so-called practical education. The general idea in this practical education was that it should prepare men to do things. The liberally educated man was a thinker; the practically educated

man was to be a worker. In so far, therefore, as either agriculture or the mechanic arts prepare men to meet these requirements they may be regarded as practical education within the limits of the statute.

(2) The industrial classes are here specifically named. It seems a natural interpretation, therefore, that we were to have a working education for a working people. The expression "the several pursuits and professions of life" intimated that all classes would be benefited by these colleges and that they were expected to dwell together in the pursuit of education. It was clearly expected that those studying the branches of learning related to agriculture and the mechanic arts, being of the industrial class, would be made more efficient in the several pursuits of life and that many of them would probably enter the so-called professions of life. It is probable also that this statute permits us to say that the various subjects here taught would introduce one to professional life within the limits of that education. It would probably be a little too much to urge that the statute anticipated the profession of agriculture or the profession of mechanic arts. It does, however, seem entirely clear that the agricultural colleges were expected to make more efficient farmers and that the colleges of mechanic arts were expected to make more efficient men in the field of mechanic arts.

From these discussions of the statute I now pass to a more specific reply to the question in the topic under discussion, namely, "how far may these colleges engage in teaching elementary subjects," and here I remark:

(1) That I see no reason why the colleges of mechanic arts should be put under any rule more restrictive than the rule now in force in colleges of liberal arts throughout the country. It is well known that with the changes that have occurred in our entrance requirements and with the introduction of the elective idea in college it has become necessary for many subjects to be begun in college. Among these you will find listed some subjects that are accepted for entrance requirements that were formerly prescribed for entrance requirements. Most colleges now give opportunity for beginning the study of Greek. They also give facilities for the study of modern languages. They also give facilities for the beginning of the study of chemistry. We may say that this is not elementary teaching or that these subjects are not elementary, but that is a mere evasion of the facts. Many a student gets his first insight in these subjects after matriculation as a regular college student. I see no reason, therefore, why the beginning of a subject may not be made in the colleges of agriculture and mechanic arts with as much propriety as in a college of liberal arts.

(2) Our topic suggests elementary subjects not generally recognized as belonging to the college curriculum. As a matter of fact there are very few such subjects. All science belongs to the college curriculum. Elementary physics is as truly physics as advanced physics. The same may be said of any other science. The same argument would apply in the matter of language, whether it be ancient or modern. So far, therefore, as the legal right of doing such things is concerned, it seems that the word "elementary" or "advanced" is not important. The real question is whether the subject itself comes within the meaning of the statute. The provisions of the second Morrill Act are interesting as in a way interpreting the whole situation. This second act recognizes the propriety of teaching English, economics, and certain other subjects, but seems to draw the line against the use of money for certain classical purposes.

(3) The significance of the statute, too, must be interpreted in the light of the classes for which the colleges were founded. Evidently the children of farmers were chiefly in the minds of Congress at the time of the discussions. As I have had occasion to say elsewhere, mechanic arts was mentioned in the discussion, but not with any great emphasis. The appeal was made largely from the view point of agriculture. Now, it would not be fair to assume that the persons who are to be benefited by the college of agriculture were persons whose educational attainments rendered elementary teaching unnecessary. That was not the condition of rural education at that time, and we regret to say that it is not the condition now. To make such interpretation, therefore, would be to impose upon all the coming students of agriculture the necessity of an education that is not now within their reach. It would imply the development of rural schools to a point quite beyond the present. The same principle would hold if we were to think of the children of industrial classes as the beneficiaries of the colleges of mechanic arts. Now it is emphasized that these colleges were to meet conditions existing in the country and provide a type of education in which Congress

expressed a profound interest. There was no effort to set up a standard for these colleges and demand of the public that they should meet that standard. The truth is the colleges were to meet a condition. This makes it all the more imperative that the question should always be a local one. In some States where rural education and village education has reached a high degree of efficiency the colleges might well take a stand and be justified in it, that would be thoroughly unjustifiable in less favored States, or where the elementary education is not so well organized.

(4) In conclusion I may say that the only rule by which we can be guided in such cases would be an honest effort to meet the conditions of the State in which the college is located. I believe it to be the duty of these colleges to use their influence to improve these conditions as rapidly as possible. Such improvement would relieve the college of some work now necessary and give it opportunity to become more efficient in the designated fields of agriculture and mechanic arts. This condition forms a solid argument on the part of these colleges in appealing to their several States for maintenance and development of a system of rural education which will make the colleges more efficient. Already a movement in the interest of agriculture in the rural schools has made some progress. This is representative of what may be done when an interest has been aroused among the people which shall result in such preparation as will make them better able to take full advantage of their colleges of agriculture and mechanic arts.

R. W. STIMSON, of Connecticut. Let me emphasize one or two points which have been raised in the paper to which we have just listened.

What did Congress intend the agricultural colleges to be? The second Morrill Act was passed for the further endowment and support of the land-grant colleges. I have read very carefully all of the debates and discussions in connection with the passage of the act, and I can not find a serious attack upon the land-grant colleges as they then existed. In case of some of the colleges and departments connected with other institutions there was serious debate and some criticism on the ground that land-grant money was being used for teaching subjects which were not obviously and immediately for the benefit of agriculture and the mechanic arts. There was no good reason why the Federal Government should give more money, therefore, for duplicating means of education which could be had in other institutions as well as in the land-grant colleges. There was no criticism of the grade of instruction, nor of the curriculum of the land-grant colleges.

Now, the land-grant colleges in 1890 had no uniform standard of entrance requirements. Some were requiring a part of a high-school course for admission. The vast majority of them, however, were admitting their students directly from the common schools to the college course. If that is true, and if the act says that the act of 1890 was passed for the further endowment and support of the land-grant colleges, is it not clear we may teach anything we please so far as grade of instruction is concerned, and provided only we keep the specified subjects? It seems to me that the affirmative is true on that point.

It seems to me that the history of the land-grant colleges since 1890 has been largely a repetition of the history of those institutions between 1862 and 1890; that is, that we have practically the same sort of institutions to-day as then existed. That would seem to indicate that Congress was right in not criticising these institutions and in spending money for the further endowment and support of this style and grade of education. In the discussions and debates of Congress on these measures, I think you would find that the term "school" and the term "institution" were used quite as often as the term "college." On the whole, then, I am forced to the conclusion that Congress intended that we should teach what the land-grant colleges had been teaching prior to 1890, and that therefore we have a free hand in doing so.

A clause of the act of 1890, however, limits the curriculum to specified subjects; but it is understood that in the Senate that clause was very earnestly debated and the original restrictive clause was thrown out. It, was, however, restored in the House, it is said, under pressure of the National Grange, and was finally accepted by the Senate in its present form. I bring this to your attention to indicate, what seems to me to be true, that this clause was prompted by an effort not to determine the grade of instruction, but to determine that these institutions to be further endowed and supported should be turned toward the industries of life rather than toward the liberal arts and professions of life in the ordinary sense of the term.

What ought you and I to do to-day with all this freedom?

In Connecticut we have two sets of boys who ought to come to our institution—boys who have been in the common schools and who have had no high schools within reach, and boys who have been in the high schools, and who are going to some sort of college, who by taste and inheritance ought to come to our institution. We had only a four-year course. We had a little agriculture in every year, and a considerable of the elements of liberal education in all the years. The result was that the boy coming from the high school had to go back, if he wanted to get our agricultural instruction, and start at the same point where the boy from the common school would start. You see what difference there was in the matter of training and mental ability. It seems to me the mental ability a man has counts for vastly more than the subjects he studies. We do not care where a man gets his brain power. If he has got it and can apply it to agriculture and mechanic arts we are ready to receive it and put it to work. But we wanted to put in the proper place the man who had not developed his brain. So we hit on this scheme. I asked a committee of the faculty to work out a two years' course of preparation for farming. They worked out a two years' course in farming open to graduates of high schools. Our curriculum as it stands to-day divides our studies into three groups of two years each. We offer attractive courses to boys who have a limited amount of education, and to boys who find it in their power to get considerable education.

In addition to this, in special subjects we give short courses varying from ten days to a year. We have found since we introduced these courses that we have come closer to our natural constituency; we have the respect of the practical farmer as we never had it before, and our short courses have fed our long courses. Besides our short-course work in the winter, we have been holding a summer school for teachers and others, in which we have limited our subjects to nature and country life, and we have had three very successful sessions.

It seems to me there is a good field for the land-grant college, and that each State may and ought to organize its land-grant college so as to meet the needs of its peculiar constituents, and that anything and everything which it is found practical to teach within these limits should be taught.

I have not spoken of extension work. I do not believe extension work is a proper use of the land-grant college money. That is, we hold that anything you can teach at the college in connection with your college courses is appropriate and may be paid for out of your land-grant college money. We do not do any extension work at the expense of the Federal Treasury. Of course we understand that each State college is perfectly free to use the money it receives from its own legislature and its own State treasurer for any purpose the State may designate.

W. A. HENRY, of Wisconsin, President Stimson is entirely right when he says that the Grange was back of those limitations in the Morrill Act of 1890. The argument was that many of the colleges had diverted much of the first appropriation to purposes not closely connected with instruction in agriculture and

mechanic arts, and to give more money without restriction would be to simply give further impetus in the wrong direction.

R. H. JESSE, of Missouri. I feel compelled to emphatically dissent from much that has been said on this subject.

I take it that Congress knew what a college was just as well as we know what a college is; that Congress said what it meant and meant what it said when it established colleges of agriculture and mechanic arts. It is very true that the standards of admission to college at that time were not what they are to-day. But college meant as truly then as it does now an institution that is based upon secondary education. And if the colleges were not up to their present rank, the same is true of the secondary schools. The college was based upon secondary education as truly in that day as it is now. In my opinion, to use any portion of the money coming from the Federal Government, either through the land-grant act of 1862 or through the appropriation act of 1890, for secondary education, is a misappropriation of Federal money.

Any State that wants to do so may, out of the State treasury, appropriate money for secondary education—that is to say, for the preparatory department of its college of agriculture; but I think that any State which does that commits a blunder. I say this with profound conviction. I want to give a little of my own experience in Missouri. In 1891 there was no standard of admission to any department of the University of Missouri. Any student could get in with an application and a fee. We began to raise the standards of admission to all departments of the university, until to-day there is no department that does not demand for admission a first-class high school education. As we raised the standards of the other departments we at first left the college of agriculture behind. The faculty of the college of agriculture contended that the condition of the rural communities in Missouri would not admit of any standards of admission to that department. But in getting all the other departments to the point where they rested on the high school system I conceived the notion that that department ought to go up too. It had a small attendance; everybody seemed to avoid it who could get into any other department. The men who came and failed to get into other departments dropped into the college of agriculture rather than go home again. It was a catch-all of the other departments, but it did not catch enough to be respectable in numbers. I brought the question before the faculty of agriculture. The whole faculty went against me except one man. After debating the thing an appeal was taken to the board of curators. I wrote to every prominent college of agriculture in the United States, asking what they thought about the propriety of demanding high school education for admission. I was greatly astonished and greatly pleased at the unanimity of the answers, for almost without exception these colleges declared that a good high school education ought to be demanded. I submitted those letters to the board of curators, who, after carefully considering the matter, by a unanimous vote decided that the college of agriculture should be raised to a parity with the other departments of the university and that admission should be based upon a high school education. The next fall the enrollment in the college was far greater than it ever had been before, and it has been growing steadily ever since. In the present year the enrollment in the freshmen class is exactly twice what it was a year ago. When we made the college of agriculture thoroughly respectable in its entrance requirements, men began to come to it, and men are now forsaking other departments to enroll in that of agriculture.

Various devices have been employed for bridging the gap between the elementary schools and the college of agriculture. The most notable of those attempts is the Minnesota experiment. In this case there is between the college and the

primary schools an institution at St. Anthony Park, the like of which can not be found on the Western Hemisphere. It is the best secondary school of agriculture I ever saw, and as President Northrup once said of it, "that school of agriculture stands in the minds of our agricultural classes for the whole university and college." That is just my objection to it. It is a screen between the people and the college and university. In spite of Minnesota's magnificent success, I am willing to risk the entire future of the college of agriculture of Missouri on my faith that the Minnesota experiment is not the right way of doing it. Let me say, however, that the Minnesota school is supported out of State funds, and involves no appropriation of Federal funds.

In Wisconsin they have established two schools of agriculture at different points in the State. I believe Wisconsin is going to equip those schools magnificently. If such schools were established in Missouri, all the counties around them would go to the legislature and beg that they be made district agricultural colleges. We in Missouri never intend to have anything between our college and the primary schools duplicating and running opposition to the public high schools of our State; but the college of agriculture, like the other departments, is going to be put in as a part of the public school system. We are striving now, though I can not point to any great results, to put agricultural studies in the public school system, primary and secondary. I believe that if these colleges of agriculture would abolish utterly all their preparatory departments, would begin where the high schools left off, would put on examiners for the secondary schools, would spend money and time and energy on the public school systems of their States, they would finally get their public school systems into desirable harmony with the college of agriculture. In Missouri we are risking our entire future on the doctrine that the college of agriculture is going to rest on the public high schools, and we are going to make the public high school agricultural as far as it ought to be agricultural. It is the long way, the slow way, the toilsome way, but I believe that it is finally the right way.

L. H. BAILEY, of New York. The history of legislation on the subject indicates that in the minds of legislators it is legitimate for the land-grant college to use the funds for elementary instruction and extension work. Whether or not it is wise for us to so use them is quite another question. We have had some discussion in New York State during the past two or three years on the subject of special schools. Three years ago a bill was introduced into the legislature of New York State, which passed both branches of the legislature, allowing the establishment of one school of agriculture and domestic science in every county in New York State, about sixty-one of them. It failed to receive the governor's signature, because it would call for some expenditure of funds from the State department of agriculture. Two years ago the same bill passed the assembly, but it failed in the Senate because the chairman of the committee to which it was referred was opposed to it, and his objection to it was that he did not believe it was wise to duplicate the public school system of New York State by any special system of education. Last year it was proposed to reintroduce this bill, but it was finally decided to let it rest until the college of agriculture matter was settled.

We have at Cornell University a winter course of about 11 weeks. I think this winter we shall have about 200 students; I should like to have 2,000. Yet, I do not believe in the winter course as an integral part of the college or university work.

I have looked upon the winter courses in the university as a temporary expedient, since there are no other institutions that can supply the demand for the kind of instruction that the winter courses give. If there were secondary or

intermediate schools that could give this instruction, the demand would not be made upon the colleges and universities. Whether such institutions will ever arise is a question concerning which I scarcely wish to prophesy. If they do not arise, then the colleges and universities must continue to supply the demand for the kind of instruction that is given in the various winter-course enterprises. It is probable that there must always be an adjunct institution to the colleges and universities in which such instruction can be given.

I am in sympathy with the movement for special agricultural high schools. However, I think that the first desideratum is to have the common schools as they now exist open to agriculture on equal terms with other subjects. This will give agriculture opportunity and will not debar it from the privileges of common school development. It will recognize it as a scholarship study, not merely as a technical or occupational subject. Whether the common schools, even when they are open to agricultural work, will satisfy the needs of the rural communities only the future can tell; if they do not, then in the natural course of events special schools will develop here and there to satisfy the demand. I do not like to think of establishing a duplicate system of public schools cut-of-hand which would seem to antagonize or at least parallel the existing schools; and it would tend to set agricultural instruction off by itself and to make it only a class subject. Of course there are many difficulties in the way of introducing agriculture into the schools as they now exist, but it is fundamentally correct to open the schools to the subject. Of course the work would need to be elective, at least in most cases. It is always objected that the schools are now full and that a new subject can not be introduced. This of course is temporarily true. The difficulty is that we are trying to introduce the new and modern subjects while at the same time trying to hold to the old curriculum. In time the whole point of view of the common schools will be radically changed and the school will be a natural product of its environment. The very fact that the new and relevant subjects are being introduced is proof enough that this evolution is slowly coming about.

I believe we have the legal right to use the proceeds of the land-grant fund for elementary instruction in agriculture and mechanic arts, but I believe we shall find it wiser policy to utilize State funds and forces already in existence for the purpose of carrying on these educational and extension courses than to use the Federal fund.

The experience of Cornell University is that it is of great advantage to have uniform entrance requirements for all departments of the university, and the attendance of students has increased greatly notwithstanding the strict enforcement of such requirements. Uniform entrance requirements in institutions in which the college of agriculture is combined with the general university is essential to the dignity and success of agricultural work.

E. DAVENPORT, of Illinois. I should very much dislike to hear this discussion closed without some reference to the movement that is on foot all over the country, namely: The consolidation of the primary schools. When you speak of transporting children to central schools, the objection is raised that horses can not travel the roads. Everybody knows, however, that more horses are now used in transporting the children and more miles are traveled than would be necessary to send them all to central schools. It is to be hoped that we will not always have to go on with the little primary schools, four or five children and one teacher.

L. H. BAILEY. I think the rural school, as we ordinarily know it to-day, is bound to pass away. It seems to me it is one of the most inefficient units in our body politic. The country mill has passed away. It can not compete with the mills in the city. In the rural school the teacher is teaching her first or

second term as a rule, temporarily maintaining herself until she can do something else. The teacher must teach everything, from the alphabet to physiology, from physics to grammar. Our extension work was intended to reach first the country school, but the more we pushed the work the more evident it became that it is very difficult to reach the country school. We think the best that can be done is to introduce the subjects in the village and hamlet schools, and where they have two or three or four or five teachers, so that one teacher can take all of the natural-history subjects and another all of the mathematics, expecting it to work outward from these centers. Centralization is going on in New York State in three or four directions.

A. C. SCOTT, of Oklahoma. It has been said here that the existing educational provisions of the country community should be exhausted before the college should seek to duplicate any of that instruction. The question naturally arises. What is meant by the educational provisions of the country community? A question of extreme importance in the West is, What shall be done with the young men of 18 or 19 years of age who have gone through the common schools but not through the high schools, and as a matter of fact do not want to go to the high schools? Shall a catch-all be prepared for them? Shall a preparatory department be provided for them where they can say they are going to college? That question gave us a great deal of concern in the Oklahoma college, and three years ago we provided a preparatory department. Two years ago we became ashamed of the department and dropped it, but we substituted a twenty weeks' course in the subject of agriculture. We found that it was very largely the young men and women who went into the preparatory department and did no advanced scientific work in agriculture who went back to the farm. For that reason we established the short courses. It seems to me it will be a very long time before we get agriculture established in the common schools of the country. What are we going to do in the meantime? I believe the present condition ought to be met by some such scheme as I have suggested, or the Minnesota scheme. We are also working in our territory on a scheme by which optional courses shall be given in the high school leading to the university.

R. H. JESSE. I believe that so long as the colleges of agriculture are maintaining their right to use Federal money for secondary education, so long as they are declaring that it is good policy to do so, they will continue their secondary schools, and will not connect with the secondary school systems of their States. For fifty years the University of Missouri maintained a preparatory department. When I came there as president, there were not six good public or private secondary schools in the Commonwealth, and I was assured that they could not be built up. Yet in the space of twelve years we have increased the good high schools in Missouri from 5 to 125. Missouri ought to have at least 250 high schools. But the rate of growth has been magnificent in twelve years. So long as you hold on to this preparatory work and these temporary expedients you are not going to catch hold of the public school system. I think the one vital thing is that the colleges of agriculture, as well as the colleges of liberal arts, should identify themselves absolutely with the public school systems of their States. Meanwhile, I am not disposed to criticise those who employ some temporary expedients, provided they have started in the right direction and are going in that way as fast as they can.

E. A. BRYAN, of Washington. One of the most serious difficulties which we face is the fact that under the ideals of the existing four years' high school the student who has taken the eight years of elementary grade and four years of high school is led away from the ideals represented by the land-grant colleges, and in most instances, unless perhaps, as may be true in Missouri, a very strong influence proceeding from the university or from some source secures a dif-

ferent result, he will be led away from the ideals represented by the education for which we stand. That is a fact and condition which we have to face, and is one of the reasonable and legitimate excuses for the maintenance of secondary schools, in which the ideal is not exclusively the old ideal, but which includes something of industrial education. In our own State we have the two institutions, the university and the agricultural college. The requirement for admission to the freshman class in the agricultural college is a high school course or its equivalent, which may be gained in the elementary school. I believe the end is precisely what President Jesse says, but the secondary school must be permeated with the ideal for which the land-grant colleges now stand, and it will be years before we learn not to resort to such expedients as have been mentioned here.

H. C. WHITE, of Georgia. I should like to say that from our experience in Georgia we are able to confirm the theory of President Jesse to the effect that a determination on the part of the college to aid the secondary schools in raising their standards is effective. Of course we suffered, just as you suffer elsewhere in the country, with a lack of studies in the secondary school which are immediately related to the technical courses in agriculture. But in what may be called the fundamental underlying studies, mathematics, for example, English in its grammatic parts, and some language other than English, either classical or modern, we find that by keeping a little ahead of the high schools and encouraging them to raise their curricula we can finally bring the men who pass from the high schools to a very satisfactory state of attainment for entering our college courses. I may be radical, but it seems to me that before a man should enter college it is not so necessary that he should have studied so many things as that he should have studied some things sufficiently thoroughly to have attained the mental maturity which will fit him for the instruction of the college. Now, if we are going to insist that before a man shall enter a course in agriculture he shall have had elementary and secondary instruction in agriculture, it will be a long time before the schools are equipped to meet our requirements. In Georgia we have a four-year course in agriculture, the entrance requirements of the college of agriculture being identical with those of the college of liberal arts. They are not as high as we should like to see them, but they are as high as we think the community will stand; we try to raise it from year to year and bring the schools up to the level. In our school of agriculture, which is one of the departments of the college of agriculture, we have courses in agronomy, in horticulture, and animal husbandry. There is no reason why a young fellow who has been in the common schools, has reached mature years, and has had the proper sort of mental discipline, can not enter these courses.

In high schools they teach a certain amount of chemistry and physics, but the teaching which they get in the high school is not necessarily of the kind that will add to the college course. Seventy-five per cent of those that go to high school never go to college. There is no need for a man in the high school, who is to go to college, to have studied chemistry at all, provided he has studied something else to such a degree and in such manner as will fit him for the work in chemistry when he undertakes it. The same in agriculture and horticulture.

Dean Henry asks: "What are you going to do with those men who are not going to enter the regular college courses?" We say there is a great deal here in these technical courses that is valuable to you. But we are trying to guard against what we consider a fundamental error, namely, to set up such a course by itself and hold it up as the equivalent of a full college course.

K. C. BABCOCK, of Arizona. We are colleges of mechanic arts as well as of agriculture, and, from my point of view, in Arizona the problem is just as imperative on the side of mechanic arts as it is on that of agriculture. Now,

the problem is: Is it legitimate for the Territory that makes high demand upon the college for education in mechanic arts to devote part of its funds to instruction in the elements of mechanic arts? There is not in Arizona, and probably not in the other three Territories, a single institution that gives good secondary manual-training instruction. Yet there is great need of manual training there. The pressure for instruction in the mechanic arts, mining, civil and mechanical engineering, is almost irresistible in Arizona, and we are obliged to prepare for the entrance into the courses in mechanic arts quite as much as for the agricultural courses.

E. DAVENPORT. It seems to be assumed regarding instruction in agriculture that it is a four-year course or a two-year course or a short course or nothing. In my opinion the unit is too large. The farm boy wants instruction in a particular subject; he is not thinking much about graduating, and when you meet him at the door the first day with the proposition that he must choose either a four-year course or two-year course or short course he is likely to take the line of least resistance. A large proportion of the work of our universities and colleges has to do primarily with students who do not graduate. For every student who graduates about three or four do not. The influence of the college and university system of this country is not exerted solely through its graduates. It is through the great mass of students, many of whom do not complete the regular courses. Let us stop talking about four-year courses, therefore, and fix the eye on the student. Let him take one or two or three years. Let him get those things he wants, without regard to whether he graduates or not.

Now, there is much elementary instruction in hitching up the team, in plowing the field and getting in the crop, in feeding the pigs and getting the steers to market, and the average student of 18 coming to us from the farm is often better prepared for college than the average high school graduate. It is an obligation of these colleges to make a system of secondary education for the country people. In Illinois we simply cut across all precedent and all lines of responsibility by saying to the boys on the farm, "Come to the university and choose the subjects you wish to study. These are the things we undertake to teach in agriculture, about 80 of them; if you want any of them, go ahead. If you can not do business here you will go home. But if you take those subjects you must take certain other subjects with them, and one of them is English. And if you stay long you will take some science, because certain subjects require science." Three-fourths of the boys that come from the farm have not had much education, but they do well in the sciences. We had 20 students six years ago, and now we have 340, taken just as they come. One-half of the work they do is done in other departments of the university than that of agriculture—civil engineering, English language, botany, history, chemistry, Greek and Latin, if they want it—and the percentage of failure on the part of our students is below the average of the university; the percentage of graduation as high. The situation is much the same in all institutions. Three-fourths of the students in all lines never graduate.

We have a splendid preparation of a scholastic order for the city people, but we have no such preparation for the country people. Let us have a little better preparatory course for the farmer, and stop talking about four-year courses and about conditions for admissions, but bring the student to the college and let him take up at once the subject he wishes to study. We are setting up too high a standard for agricultural courses when we demand that if students will not take the four-year course therefore they must take something peculiar and inferior. If you confront them with such conditions you will drive them out of the agricultural courses. It is not done in other lines; why do it in agriculture? Identify the boy with his subject. We have seniors, juniors, sopho-

mores, freshmen, specials, all together in the same class. You may protest against that, but bear in mind these boys are studying Shorthorn cattle or some other technical subject. The special student has a herd of Shorthorn cattle at home, perhaps, and he is as able to study Shorthorns as the senior, and sometimes better. They can meet on a common ground in the class room. Give them a chance at election; do not drive them into something they know nothing about. If a student comes to us at 18 years of age and is deficient in English, i. e., has less than 42 credits, or three and one-half years of high school work, he must go to the preparatory school and take English. He may choose his other subjects. If he is 16 years old he must spend half his time in the preparatory school, and the other half may be given to other subjects, allowing him to elect any subjects he is able to carry. The fact is we have very few students under 18. Most of our students are 18 or over. A great many of them are between 18 and 21. At about 17 or 18 or 19 boys begin to think they are too old to go to high school, and if you do not let them into the college you will never get them. If the boy is 18 years old we shut our eyes to all deficiencies except English.

He can graduate here without mathematics, but he must take two years of foreign language, because the foreign language, we think, is nearer to agriculture than is mathematics. If we had a department of agricultural economics—which we hope to have—the student in that course would be required to have mathematics, or if he elects subjects requiring mathematics he must take mathematics now.

A. SCOTT, of New Jersey. I sincerely hope that it will not go down on the records that the assumption that Professor Davenport has made is generally true. That all our institutions are like his in all particulars, excellent and otherwise, will not be accepted as the consensus of this body, because I am quite sure that some things he has said of his institution are not true of mine. We require of every boy who comes to college that he shall know algebra, plane geometry, and solid geometry at least, and must pass examination in these subjects. I should not like to have it said that three-fourths of those who go to our college are not graduated, for it is not true. More than half are graduated, although many fall by the way for one reason or another. This is a local issue. It is becoming more and more apparent every year that we must recognize that differences of conditions that are fundamental have to be taken into account. These are schools of agriculture, and, as my friend from Arizona has said, of mechanic arts. They were founded for training in the sciences applied to industrial pursuits, for the poor boy of the city as well as for the poor boy of the farm. We recognize in New Jersey the importance of agriculture. It is second to none, but there are others that should stand on a parity with it. We have laid great stress on agriculture. In New Jersey, for example, there is a vast field for the civil engineer and the mechanical engineer, and we must make adequate provision for instruction in these and similar lines.

This is, moreover, a matter of mental training rather than of special subjects. What we want of the boy is power, not special training.

W. O. THOMPSON. To recur to the original paper that brought out this discussion, the question first was the legal right to teach the elements of this subject. I hope the paper made it clear that the elementary teaching was not confined to schools below the college, but that in our colleges there was elementary instruction in many subjects, and that the definition in the statute or elsewhere could not limit the instruction, if it insisted on subjects rather than method. I think we also realize from the discussion that we are confronted with a condition to which these colleges must address themselves. There has been agreement that we are all trying to meet that condition, and there has been

some disagreement as to how it should be met. I may be permitted to say that in the institution which I serve the entrance requirements are rigidly enforced. I do not want the impression to be left in this meeting that any institution in this circle of colleges has fallen to the low depth of its privileges under the law, but that all are trying to rise to the highest of their privileges under the statute. I think no one of us would ever regard it as possible for us to be content with the perpetual condition of doing what we do not desire to do but what we think ought to be done as a temporary measure. It may be that for five years or it may be that for five hundred years there will be a large class of young men who may be interested in agriculture by one method that never would be interested in it by another method however perfect theoretically. So far as pedagogical theory of instruction in agriculture is concerned, I think these colleges must meet the conditions, but I think none of them should make an apology for a low standard of entrance.

On motion, the section adjourned until 2 p. m. next day.

AFTERNOON SESSION, WEDNESDAY, NOVEMBER 2, 1904.

The section was called to order at 2 p. m. by Chairman W. E. Stone.

MILITARY INSTRUCTION.

The following paper by M. H. Buckham, of Vermont, on "The intent and purpose of the Morrill Act with regard to military instruction." was read by G. E. Fellows, of Maine, in the absence of the author:

The bill for the endowment of colleges of agriculture and the mechanic arts, which passed both Houses in April, 1858, and was vetoed by President Buchanan, did not contain the provision for instruction in military tactics incorporated into the later bill. In a speech by Mr. Morrill on April 20, 1858, setting forth at great length the objects and provisions of this first bill, no allusion was made to military instruction, nor was there any reference to it in the course of the debate. The bill to which the present colleges owe their existence was introduced, debated, and passed in the summer of 1862, and bears the significant date July 2, 1862, the day following the last of the seven days of McClellan's Peninsular campaign. In the course of a speech in the House explaining and advocating the measure, Mr. Morrill put considerable emphasis on the military feature of the education provided for. I quote passages from different parts of his speech:

"If this measure had been instituted a quarter of a century ago, the absence of all military schooling at the outset of the present rebellion would have been less deplorable in the Northern States. The young men might have had more of fitness for their sphere of duties, whether on the farm, in the workshop, or on the battlefield. * * *

"Something of military instruction has been incorporated in the bill in consequence of the new conviction of its necessity forced upon the attention of the loyal States by the history of the past year. A total unpreparedness presents too many temptations, even to a foe otherwise weak. The national school at West Point may suffice for the Regular Army in ordinary years of peace, but it is wholly inadequate when a large army is to be suddenly put into service. If we ever expect to reduce the Army to its old dimension and again rely on the volunteer system for defense, each State must have the means within itself to organize and officer its own force. With such a system as that here offered—nurseries in every State—a sufficient force would at all times be ready to support the cause of the nation and secure that wholesome respect which belongs to a people whose power is always equal to its pretensions. In a free government we have proved, notwithstanding some 'in time of temptation fall away,' that patriotism is spontaneous, but doubtless many valuable lives would have been saved in the progress of this plague-spotted rebellion, had we not so long assumed that military discipline was also spontaneous. If ever again our legions are summoned to the field, let us show that we are not wholly unprepared. These colleges founded in every State will * * * to some extent

guard against the sheer ignorance of all military art which shrouded the country, and especially the North, at the time when the tocsin of war sounded at Fort Sumter."

These words clearly explain the object which Mr. Morrill had in view in making provision for instruction in military tactics in the colleges of agriculture and the mechanic arts.

The presence of a great conflict, which found the nation unprepared to meet either internal or external enemies, awakened public opinion to a sense of danger—a danger not only in the past, but ever present; a danger which could not be met by an extemporized army, or a levy en masse, but only by a provision which should be of the nature of an institution, not subject to temporary change of feeling, not liable to failure from neglect or forgetfulness. To statesmen looking beyond existing tumults the Republic meant peace, but they were then for the first time learning that peace exists only in those nations that know how to maintain peace. To keep up a large standing army was contrary to the genius of American liberty and to all national traditions. But here was an opportunity to do something toward meeting this ever-present danger of "unpreparedness" by distributing throughout peace-loving and industrial communities in every State a certain amount of "military schooling," as Mr. Morrill calls it, and the result of such schooling in a goodly number of men, highly trained in other respects, with a modicum, more or less, as the plan should work out, of military training superadded.

It may be pertinent to note that, when, twenty-eight years after the passage of the bill, in the "piping times of peace," Mr. Morrill again asked Congress to consider the needs and claims of the education offered in the colleges of agriculture and the mechanic arts and to increase their scope and their efficiency by an increased endowment, no further provision was made for, and no mention was made of, military instruction.

Passing now from consideration of the motives and utterances of the founder of the colleges to the language of the organic act, we find that the intent and purpose of the act as regards military instruction gets rather scant expression. It is all embraced in three words—"including military tactics"—"one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach, etc." That constitutes the entire mandate on the subject. It is evident that the intent of the act was not to establish military institutions—that is, institutions in which the leading object is to teach the military art. Classical and other scientific studies are not to be excluded, and military tactics are to be included, but the leading object is to teach branches of learning related to agriculture and the mechanic arts. Evidently there were not to be military academies after the manner of West Point in all the States, nor feeble imitations of West Point.

If some institutions or some army officers detailed as military instructors in the colleges have desired to make the military the leading feature, to insist on army ideas and methods in the government of the institutions, and to subordinate practically the other elements to the military, this has been without warrant from the ordaining act. If this had been the intent and purpose of the founder and of the act of Congress, they would have declared military training to be the leading object, whereas it is not included among the leading objects.

What is meant by the term "military tactics," which the act says are to be included in the branches taught in the colleges? Obviously the word "tactics" is used in a general and popular, not in a technical sense. "Military tactics" is a broad and elastic term, including much that would not come within a strict definition. This breadth and comprehensiveness, in distinction from a rigid prescription of specific things to be done, is characteristic of the whole act. It recognizes the great diversity of conditions existing in different parts of the country, and now that it is operative in forty-five different States, this elasticity and adaptability to conditions appears still more admirable. It is matter for congratulation that we have in this grand scheme for national education, not a thoroughly organized, bureaucratic system like that which fits in well with the genius of the French people, but a simple outline, a broad, free, suggestive sketch plan, of the general objects to be sought, leaving to the several localities, and specifically to the legislatures of the several States, to fill in the details as their special needs and interests may prescribe. As in the case of all other branches of learning, so in case of the military science and art, the institutions are left free to work out their own problems in their own way, provided that way comes fairly within the express provisions of the act of Congress. As we have seen, the incorporation of military instruction into the curriculum of the

colleges was intended to meet one of the great and permanent needs of the country. Such instruction is mandatory upon the colleges. By the acceptance of the grant with its conditions this instruction has become an obligation, recognized as such by the colleges. So much—that the colleges shall give instruction in military tactics—is, so to speak, constitutional, unalterable, not debatable. All else is merely statutory or administrative, subject to by-laws, as wisdom and good policy may ordain.

Leaving, therefore, large latitude to the predilections of individual institutions for more or less of the military feature in their curriculum, what may the colleges, in an average way, be fairly expected to do as their part toward supplying the country with a soldiery in time of need? The organization of a national militia under Federal laws in all the States has materially changed the situation since Mr. Morrill pictured the nation's "unpreparedness" in 1862. When not recognized as a part of the militia—as they are in some States—the college battalions represent the possibility of a volunteer corps which would be immediately effective for service, and the individual students and graduates constitute a body out of which officers, commissioned and noncommissioned, could be drawn for service in a suddenly enlisted corps. It can not be expected of the colleges that they turn out thoroughly trained and accomplished officers. It takes four years of military training at West Point to do that. To attempt even something very much below this would take so much of the students' time and energy from their main studies that they would go to colleges in which this burden was not laid upon them. But the colleges, without sacrifice to their "leading objects," may so train their students in the military art, that they, or a good number of them, would make serviceable sergeants, lieutenants, and captains in any force which the State or the nation might need for keeping the peace and enforcing the laws. It is of some consequence that students should make a good appearance at inspection or on parade. It is of much more importance that they should learn some of the soldierly virtues, prompt obedience, power of command, the fine combination of self-respect and submission, which make the good citizen and the good patriot as well as the good soldier.

But on this part of the subject I am privileged to offer the expert evidence of an able and accomplished officer of the Artillery Corps and a highly successful professor of military science and tactics in the University of Vermont, Capt. C. J. Bailey, Fifteenth Artillery. Captain Bailey says:

"An opinion is desired as to what extent military instruction should be carried in the land-grant colleges.

"Throwing out those institutions in which the military feature predominates and is advanced as an attraction for students, there remain the colleges or universities in which the student is fitted for almost any profession save the military. In these every hour devoted to military work takes from the student an hour he might advantageously devote to studies in the particular line he has chosen. Should, then, this military work be limited to three hours weekly, and is even this worth to the student and to the college the advantages gained by both from the endowments made by the Government?

"When the writer took up this work in the University of Vermont in 1897 he was of the opinion that the three hours weekly was inadequate for carrying out the purposes desired by the Government and he still believes that it should be increased, at least during that part of the college year when outdoor work can be carried on, if this can be done without positive detriment to the other work of the college. If this can not be done, however, sufficient instruction can be done in the shorter time to render its value incontestable, particularly if the instructor is allowed some latitude in dividing the students in such a way that small bodies can be instructed in certain parts of the work rather than the whole student body at once.

"In colleges keeping to this minimum much that an officer deems essential in teaching recruits must either be omitted or the student so interested that he will voluntarily do the work by himself. This refers particularly to the 'setting up' drills and calisthenics now so largely employed in the Army. The college gymnasium may and should take the place of these, for it is particularly necessary that the student should have them or similar work both to keep him in health and to give him the erect carriage distinctive of the good soldier and equally advantageous to the good civilian. But the writer realized from his first attempt that to make any progress in the drills of the company and battalion nothing beyond a superficial course in these gymnastics could be attempted.

"Both theoretical and practical military work can be so varied that the interest of the majority of the students is easily retained, the difficulty being to

decide on what to omit where time is so limited. Many students find the whole subject uninteresting and even distasteful, and these are the ones to whom much attention should be given, for they are generally the ones most in need of the physical exercise—for their own health. The athletic men are generally the best soldiers and take the most interest in lectures and recitations as well as in the drills.

"That the work so outlined is of value to the Government can not now be questioned. The many valuable officers now in the Army whose only military training was obtained in the land-grant colleges bear testimony to this.

"Earnest and faithful work on the part of the instructor, with the cooperation and support of the faculty, aided by the natural liking of many students for the military, can not fail to render the course successful and give the Government a fair interest on its investment—even with but three hours weekly for each student. The more this time can be increased the better for the Government and, in the opinion of the writer, for the physical and mental welfare of the student and the ultimate good of the college."

Coming now to the second part of the question proposed, namely, the relation of the colleges to the War Department, there are two attitudes which the Department may take with reference to military instruction in the colleges. The one view is that the Government has bestowed large endowments on these colleges, and has a right to demand in return special military service which men educated in these colleges can render, and to prescribe the methods of the training which fits them for that service. To this view no objection can be taken if it is not in practice carried so far as to exact of the students an amount of effort which would impair their efficiency in their chosen field of study, and so drive them into other institutions and thus defeat its own intent. It is natural also and honorable in the military authorities at Washington that they should seek to prescribe a standard of instruction and discipline which bears some comparison with that splendid training at West Point which gives dignity and prestige to an officer in the Army of the United States, or at least that their point of view and their estimate of military education should be largely under such influence. Then there arises a difference of judgment between the Department and the colleges as to how much may be insisted on in the way of military discipline, in which we find the Department virtually saying to us, with military courtesy, but with military firmness: "We will not detail an army officer to conduct your military instruction unless we can dictate substantially the amount, the methods, and all the conditions of such instruction."

The other view which the Government might take is not to insist on military training as an obligation on the part of the colleges and the detail of an officer as a concession carrying with it a certain supervisory right over the colleges, but to look at the whole situation as an opportunity of which both parties should strive to make the utmost for the good of the country at large.

Here is a body consisting of many thousands of the choice young men of all the States of the Union, as good material as the country or the world affords for making citizen soldiers—such soldiers as the country is likely to need—and at an expense to the Government which is trifling compared with what any other method of getting such soldiers would cost. There is a certain amount of the military spirit—call it the patriot-military spirit—which it is desirable to cultivate in our youth—not too much, not the militarism of France and Germany—not too little, not the supineness and neglect, inviting assault, of the North before the war—but enough to inspire a sense of security and compel respect. Let the Government take advantage of the opportunity it has to get this moderate amount of military spirit diffused among the young men of the nation and, along with it, the moderate amount of military training which will make it practically effective in time of need. This it will best accomplish, not by setting up a military régime of its own within a literary institution, not by issuing orders from Washington which ignore or override the policy and the regulations of the colleges, but by cooperating with the institutions in a patriotic endeavor to make such adjustment of the legitimate claims of the civil and military departments, respectively, that all shall attain their maximum efficiency. Passing over some of the obvious considerations under this head, we may be permitted respectfully to suggest for the consideration of the Department:

(1) That less emphasis be placed on the manual and technical branches of military training, and more upon the higher, the intellectual, topics in the military art. College students take "military tactics" as part of a liberal education, not to fit them to serve as enlisted men. Introducing a certain amount of

strategy, the history of campaigns, fortification, problems in "grand tactics," etc., would bring the instruction more within the range of college studies.

(2) The inspectors sent to examine and report on the condition of the military departments in colleges should be experienced, broad-minded men, capable of understanding the situation in its larger meaning and possibilities. Some of the institutions have had occasion to complain that young officers, from inability to appreciate the difference between a literary and a strictly military institution, have done them great injustice by setting up an impossible standard of efficiency and severely commenting on alleged delinquencies. The inspector, especially if continued in office long enough to learn its possibilities, can, by conferring and cooperating with the college authorities, by instruction and advice to the cadet officers, and in many other ways, easily double the efficiency of the military instruction. The institution represented by the writer of this paper enjoyed all these benefits and others under the inspectorship of Col. (now Gen.) R. P. Hughes, U. S. Army. A well-trained officer, a strict disciplinarian, and a thoroughly soldierly man, he interested himself to bring the college battalion up to the highest state of efficiency and to promote the true military spirit among the young men of the institution. In doing this he gathered to meet him the officers of the battalion, lectured them, scolded them, praised them, instructed them, and so discharged the duties of his office in a way at once professional and human that his visits were looked forward to with interest and remembered with pleasure, and though his reports sometimes scored us severely we knew that they were just and kindly. If the Government would always send out inspectors equally faithful to the War Department and equally helpful to the institutions, there would be little cause for complaint on either side and the problem of efficient military training in the colleges would be in a fair way of satisfactory solution.

E. R. NICHOLS, of Kansas. I am very much in favor of military drill from every standpoint, and I believe it is fortunate that it is a part of the endowment of these colleges. It seems to me the management of this military matter is largely a local affair. I have reference now as to whether it shall be one day or two days or five days a week, and whether it shall be one, two, three, or four years, whether it shall be in the fall or spring terms or how it shall be. In our college we would as soon have drill four days in the week as two, but we would dislike to have it five days. It is desirable to have one afternoon off in which students can have their literary and athletic exercises and things of that nature. It is desirable that we have drill four days and not five days. I would propose as a possible solution of this question that we ask the War Department to state the maximum number of hours that will be satisfactory to them for practice, for theory, and for the ceremonials, leaving each college to apportion the time through the week as best meets their conditions. We have tried various ways of meeting the present requirements without success at the Kansas Agricultural College. I believe, however, if we would ask the War Department to fix the number of hours for practice and theory and the ceremonials that we can adjust ourselves to the condition unless it is made very difficult.

C. C. THACH, of Alabama. There are some points that have been covered in the paper by President Buckham and in the comments by President Nichols that I think should be emphasized. We have had experience in military instruction in our institution in Alabama since its inception about thirty years ago, and we stand, I think, somewhat on the middle ground in that respect. I agree with President Nichols that this is a local question very largely, and the conditions vary widely in different institutions. It should be left in all its details and minutiae to the boards of control of the several institutions. In our institution we have a quasi military organization, but much attention has from the first been given to military training.

The act of 1862 explicitly requires such training, and I do not believe that we can comply with the spirit or the letter of the law without having military instruction of a very definite and fixed amount and nature. Our experience bears out the statement by President Buckham that the United States Government

has been greatly strengthened by the success in military instruction of these land-grant colleges.

We should not lose sight of its value as an educative force, particularly in a military way and in patriotism, but another advantage is the physical training it gives. I believe it is worth while to have it for that reason. I am a great believer in all forms of athletics, but only a small percentage of the student body actually participates in athletics or even work in the gymnasium. President Eliot, of Harvard, found that out of about 3,000 students only about one-third took active part in athletics. Military instruction furnishes a readily available means of giving all the students the physical training they need. It furnishes exercise, not simply as a gymnastic, but exercise with the ulterior purpose of training the men for something definite. We must not minimize the military feature. I believe it is a question of education, not only in preparing a man for military service and in inculcating patriotism, but I believe the training is in itself educative.

As regards the practical application of this matter, I think you will have as many views as you have States. I believe the question ought to be approached in a conciliatory manner. Military men are easily antagonized. They want men to obey whether or not. Therefore I do not believe in the extreme military feature. But we can approach the question in an amicable spirit. I do not believe, however, that the suggestion of the minimum amount of hours will meet the situation. I think two hours is too small. We have three now. We used to have five, and that was undesirable, but we get along very well with three. We haven't had an army officer in six years, but during that time we have made our quarterly report, and we get our arms. If five hours' drill are to be required we are not in a hurry to get under the Government. We now have in charge a man of our own training, who knows the situation and is willing to adapt himself to conditions. We have two general roll calls a day and three drills. The seniors have power to report offenses of various kinds. We do not find that power abused. We excuse our athletic teams, but it does not preclude them from promotion as cadet officers. Some of our best cadet officers are from the athletic team.

E. A. BRYAN, of Washington. For a thousand years or more we and our ancestors have believed in the citizen soldiery. We have proceeded on the theory that our national defense is to be intrusted chiefly to the citizen soldier. Along about the time of the civil war we woke up to the fact that the National Guard, which had been intrusted in a measure with the training of the citizen soldier for times of defense, was a poor reliance; that it was not in shape to serve the purposes of national defense, and I have no doubt, as has already been intimated, that it was due to the condition we then faced that the military clause was inserted in the first Morrill Act. I remember hearing a volunteer officer in the civil war say that in his entire regiment at the outbreak of the civil war there was not a single man that could drill a squad. I have no doubt that the statesmen of that day and citizens of that day felt very keenly the fact that there were few intelligent and educated men who had any knowledge of military science and tactics, and that it was due to this that at that time a new theory was injected into our system of national military education. As a result of that we have to-day three general plans of military education: First, that which is typified by West Point, a distinctly military school for the training of military officers: second, the National Guard, where for a few days each year the citizens who volunteer in the companies are trained, and third, the students who are trained in the land-grant colleges in this way. I approve this as a national movement, as a great means of national defense. I believe we should have a general system which will provide men of intelligence and education.

who can in time of war or stress be called upon for service of this kind, and I wish to point out to you the fact that since 1832 there has been an entire revolution in our system of national militia. At that time it was wholly and totally inefficient; to-day we have a very efficient National Guard. If we were able to inquire in detail into the facts, I believe we would ascertain that the introduction of military instruction into the land-grant colleges is chiefly responsible for that result. This fact became quite apparent particularly at the time of our late war with Spain. Many commissions were issued in the United States Army at that time to persons who had had their training in these institutions. So that not only through the direct participation in military affairs by the students who had been graduated at these institutions, but by their participation in the legislatures of the States, and by their influence in molding public sentiment throughout the States, they have aided in establishing a system of national defense far superior to that of forty years ago. Notwithstanding that fact there are many things in our system that need amendment, and it is possible for this association to do much that would lead to a better state of affairs. I would call attention to the fact that while for forty-two years we have had this law upon our statute books, there has been very little done by the Government to provide for adequate instruction within the colleges. We have been supplied with a portion of the equipment necessary—guns and ammunition chiefly. There are many things needed for proper instruction which are not supplied. While the National Guard, drilling less than one-twentieth of the time that the students do in our colleges, are supplied with uniforms, the students of the several colleges are not supplied with uniforms. I believe this association should urge upon the War Department the more adequate equipment of the military departments of the several institutions. While I have this high appreciation of the value to our nation of this instruction, and while I believe it would be possible and very desirable indeed to be better equipped for it, yet I certainly feel that the present attitude of the War Department is by no means a fortunate one. You will remember that for many years the officer who was detailed as commandant in any institution was directed to report to the president of that institution for orders, and that the War Department did not give direct orders to the commandant. I think you are also aware of the fact that to all intents and purposes they now ignore the institution and its officials and give direct orders to the officers of the Department as to their duties. I think you will all concede that it is utterly impossible to administer any institution properly where some other authority may come in and direct or modify or control by order the programme of work. I quite sympathize with the suggestion which has been made that steps should be taken, perhaps through the Secretary of War or by calling the attention of the President of the United States to the question, to improve the present situation. It seems to me the time is ripe for doing something in this direction, and I believe it will not be to the injury, but to the benefit, of the great system of national military education.

I believe this association should also solicit or attempt to secure some further recognition of the work done by the land-grant colleges in the direction of the military instruction. Lately we saw with approval an order for the appointment to commissions certain graduates of schools where military instruction is given. Of the six schools chosen last spring I think not one was a land-grant college; all were private military schools where young boys attend and where the leading feature is military drill. It is true that the older, more experienced men in the land-grant colleges have perhaps not given so much time and attention to military drill as the younger boys in certain military schools which make their military departments a specially attractive and

prominent feature, but the late war with Spain shows that those officers who came from the land-grant colleges served with distinction and with credit. I believe that the best results that we can hope to obtain will be by the recognition of these institutions as an integral part of our system of military education and a proper source from which upon occasion the officers of the United States Army may be recruited.

C. R. VAN HISE, of Wisconsin. The question for us is, What is the minimum to which we can all accede? The irreducible minimum of two hours per week incorporated in the resolutions offered in general session this morning (see p. 63) was selected because this is the amount which is the practice of various large institutions at the present time. We in Wisconsin have two hours per week, and we hold that to be a full and fair compliance with the Morrill Act. We require also two hours of athletic work two days per week in the gymnasium, so students get the setting-up exercises and development work which in other institutions is done in the military department. The resolution does not say that the officers shall not give more than two hours per week during two years. Indeed, at the University of Wisconsin and at other institutions, all officers are selected from the junior and senior classes and are required to give two hours additional work during three or four years in order to make effective their work as drill officers.

I am sure the resolution expresses the view of a large number of colleges as to the irreducible minimum. I feel that if the association will unite we can get the Secretary of War to give a decision on this point.

MR. THACH. It seems to me that taking action as to an irreducible minimum of two hours a week rather puts the colleges that require three or five hours in an improper position with their student bodies.

MR. VAN HISE. Not at all. If a college does not require much gymnastic work it is proper to require more military work. In Wisconsin we used to require four hours a week in military in the freshman and sophomore classes, but when we got a large body of men we believed it proper to give half the time to military work and half to athletic work.

A. SCOTT, of New Jersey. The original Morrill Act intended that the legislatures of the States should prescribe the curriculum, only conforming to the general statement of the law. The State legislatures have very properly given the matter into the hands of the trustees, and the trustees have intrusted it to the faculty. There is in theory a perfect system of national and local control. I am not behind any of those who have spoken in giving tribute to the excellencies of this form of education up to a certain point, but by virtue of the Morrill Act we are not constituted a set of military colleges, and I think this association should insist upon its right to control the military instruction provided for in the organic law of the land-grant institutions.

R. W. STIMSON, of Connecticut. It seems to me that the relation of the land-grant college to the War Department is one purely of a bargain, and I think the War Department is at perfect liberty to state terms, provided it states them explicitly and does not mislead. If the War Department says, "If you want so much equipment gratis; if you want a military officer gratis, and are willing to give five hours' instruction a week on specific subjects, we will close the bargain with you," it seems to me that is perfectly legitimate, right, and proper.

L. H. BAILEY, of New York. It is competent for any of these land-grant colleges to have its own officers in military instruction. Is not this the solution of the matter? In that case we have no favors to ask.

E. A. BURNETT, of Nebraska. The conditions have become so difficult in our institution that unless some modification can be made within a year or two there is no question that the regents will find it necessary to permit the War

Department to withdraw its detail and its equipment, if need be, and proceed with our military instruction under such conditions as we may be able to afford. This is a matter of much regret to the chancellor, because he believes in military instruction.

W. O. THOMPSON, of Ohio. The section of the first Morrill Act which relates to military instruction is as follows:

The President may, upon the application of any established military institute, seminary or academy, college or university, within the United States, having capacity to educate at the same time not less than 150 male students, detail an officer of the Army or Navy to act as superintendent.

I call attention to the wording of the statute in order to show that it is not mandatory, but permissive. Under this statute the President may detail, or he may decline to detail. In time of war, when the officers are in demand, he may refuse a detail, and during the Spanish war he did not detail anybody except retired officers. But since that war there have been some detailed who are not retired officers. There is not a college in this whole association that can meet this Order No. 65 with five hours a week. If they could do so they would, and say no more about it. Some of them now give four hours of drill and an hour's instruction in addition, but they can not give more than that without seriously interrupting the work of the college. The mandatory character of this order has raised the question as to whether we can obey it. Our commandant says we can not do it. If we have entered into an agreement, as suggested by President Stimson and Dean Bailey, we can close the contract or decline to renew it. I think it altogether likely the Ohio State University will request the Department to cut off the detail of its officer, and then will make some arrangement of its own. I do not see any other way out of the difficulty.

I shall not object to a minimum of two hours, but I fear that if we make the minimum so low as two hours it will simply irritate the army officers.

It seems to me that the method of attack of this association, if an attack is to be made, is to go by competent committee on which I should have some recognized military man, to the President of the United States and state our difficulties, and ask his advice. I would refer this resolution to our executive committee for consideration with a view to devising some means of reaching the matter through the President, giving them full power to act, knowing very well what the state of sentiment is in this body.

J. K. PATTERSON, of Kentucky. About eighteen years ago in the preliminary meeting that was held in Washington to take steps looking toward the organization of this association, this question came up and was debated with a great deal of earnestness, I may say with not a little acrimony. There were a few of the colleges represented on that occasion who were quite willing, and I may say anxious to comply with what they believed was the spirit and intent of the organic law as set forth in the act of 1862. They held that there were two or three things that were made obligatory in that organic law. One was, teaching those branches of learning relating to agriculture, and another those relating to mechanic arts, and another relating to military tactics. There were certain subjects that were optional, that might be included or might not, and these were classics and other scientific studies. They held that if it was obligatory upon the colleges to teach sciences relating to agriculture and to mechanic arts, it was equally obligatory to make provision for carrying out what they believed to be the intent as well as the letter of the law in regard to the instruction in military tactics; that they could not set aside the one without setting aside the other; that there was no more reason why they should adhere to military tactics and mechanic arts and eliminate agriculture than there was to adhere to agriculture and mechanic arts, and eliminate or perform in a perfunctory

way military tactics. I remember that those who held these views were in a small minority. Some were willing to abolish military tactics in the colleges at that time altogether, and to brave the consequences, whatever they might be. Others wished to reduce it to a very small minimum; I was among those who proposed to carry out in good faith what they conceived to be the obligations of the act. From the beginning of my administration of affairs in the college of agriculture and mechanic arts in Kentucky, in 1869, to the present, I have endeavored to carry out the act of 1862 in its fullness and totality. We have had no difficulty with the War Department, and have encountered no difficulty in carrying out Order No. 65. Until about three years ago we required all male students to drill throughout all classes and allowed no exceptions or evasions. Now the senior class is exempted from military service.

As a matter of interpretation of the law, I think this matter ought to be regulated by the State to which the grant is given, but no specific action has ever been taken with reference to this burning and vexed question that has tormented us for years. If any legislature would take the initiative in defining what it conceived to be the duties of the colleges organized and controlled by it under the organic law of Congress, or say what they wanted done, it would bring a direct issue between the legislature and the War Department of the United States, but I do not consider it wise to do this. In my opinion the present crisis is very largely our own fault. All of us who have attended these meetings for the last fifteen or twenty years know that there have been a number of colleges represented in this organization that have always stood for military tactics and military drill. There have been a number that have constantly been endeavoring to avoid and minimize it, and some would have been glad to eliminate it altogether. For a number of years an inspector did not come around at all, but within the last ten or fifteen years the inspector sent by the War Department has come around annually. He visits the commandant, and the president and some of the cadet officers, and he makes up his report from what he hears. It is on account of the unfavorable character of some of these reports that Order No. 65 has been issued by the War Department.

MR. THOMPSON. How many hours a week do you give to this matter?

MR. PATTERSON. Five hours a week.

MR. THOMPSON. We are giving four hours a week to drill plus one hour of instruction, and we have been censured. Our commandant says we can not carry out Order No. 65 with ten hours a week.

MR. PATTERSON. When Order No. 65 came I had a conference with the commandant, and I said, "It matters not whether it subjects us to any inconvenience in other directions or not, you must carry out loyally the spirit of this order and its intent, and if five hours is not sufficient, you will have to take a sufficient amount of additional time from other duties connected with the college." The military instruction is a popular feature in our institution.

We were fortunate enough to have upon our first board of trustees a major-general of volunteers, who drew up the regulations for West Point fifty years ago, and he impressed the military spirit and the spirit of the military organization upon the State college of Kentucky, and it has never sought to escape from it. From another point of view I conceive that military instruction is one of the best features of these land-grant colleges. As stated by President Bryan, we raise our armies not by conscription, but from the volunteers. Now, in the event of a great national crisis, and in view of our great national expansion, we must provide and educate citizen soldiery that is capable of meeting emergencies when they arise. Military training will always be popular in this country, because we are potentially a military nation, and will have to provide the military education by which a citizen soldiery will always be at the com-

mand of the United States of America. One of the features of this training is the habit of obedience, which it inculcates. I submit to every one of you gentlemen here that obedience to law and wholesome submission to salutary restraint is one of the great desiderata in the education of the young men of America. We are inclined to be somewhat lawless—we have the reputation of being lawless. In looking over the penal statistics of Great Britain, of the United States, Germany, and France, you will find that, unhappily, we are very largely in the ascendant with the percentage of crimes, the percentage of murder, the percentage of deeds of violence to which the habit of disobedience necessarily leads, as compared with any other civilized countries of the world. But we can make this military education in these several institutions auxiliary to the improvement in this respect, and, it seems to me, it would be well worth the expenditure of our time and worthy of our consideration and efforts.

After some further discussion President Van Hise's resolution was adopted in modified form, as already given (p. 63).

WHAT DEGREES SHOULD BE GIVEN FOR THE COMPLETION OF UNDERGRADUATE COURSES IN LAND-GRANT COLLEGES?

G. A. Harter, of Delaware, presented the following paper on this subject:

The subject that has been assigned me by the programme committee to-day gives me peculiar satisfaction in that I shall be able to present my personal views instead of being required officially to announce a distasteful practice, as I must do in college publications and at college functions.

"What degree shall be given for completion of undergraduate work in land-grant colleges?" has been asked by each of these institutions and has brought forth a great variety of answers. When these colleges were first organized there was no uniformity of conception among educators as to the work that they were meant to perform in the national educational economy. Provision was made in the law approved by President Lincoln, July 5, 1862, for "the maintenance of at least one college in each State where the leading objects shall be, without excluding other scientific and classical studies and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may, respectively, prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." This was a time when the old forms of education were found to be inadequate for the training of men for the several pursuits of life, and new methods and new schools, wider in every sense than the old classical college, were springing up. The old college, with its Greek, Latin, mathematics, and modicum of science no longer filled the want of those who sought an education to train them to do things in the affairs of the world.

The college was no longer looked upon as the place where boys should go to get preparation for entering the so-called "learned professions" only, but young men began to find that they could be fitted for other occupations that demanded as serious application of mental powers as were used by the preacher, the lawyer, or the doctor. The Morrill law of 1862 was but an expression of the great popular dissatisfaction with the old-fashioned college curriculum. It was an attempt to adjust the new education, as it was at that time understood, to meet the new requirements of the sciences in the college course to the training of the industrial classes.

The historian of the future will point with pride to the sympathy of the United States Government with this great popular demand for widening and deepening in every way the channels through which the various organized agencies of educational processes have laid hold of American life.

Soon after the passage of the land-scrip bill, colleges were organized in every State, beneficiary of the provisions thus made for them. In some States they were established in connection with colleges already in existence, and new life was put into these old institutions by the enlarged opportunities made possible by widening their curricula and enriching their courses of study. In other States a new kind of college was founded in order to teach agriculture and the mechanic arts. In still other States the funds arising from the national grant were either applied to the founding of a State university or

were used as part of the funds of a State university; in either case they were set aside directly for instruction in such branches of learning as are related to agriculture and the mechanic arts. This movement, which was at work in the organization of the new land-grant college, was also taking hold of the older colleges, and the courses of study offered to the youth who matriculated in one of these institutions in the last quarter of the nineteenth century greatly astonished the father's mind who was a student in the middle of the century, by reason of the fullness and richness from which his son could elect such studies as afforded the best preparation for his after life. The sciences and their application to the various professions of life had found a place in the curricula, and it was soon found impossible for anyone to get more than a smattering of elementary principles if he should attempt to take them all.

There was great diversity of conception of the functions of a college, and especially did the land-grant colleges differ in their organization and practice. However, they honestly set about their work and had demonstrated their usefulness in such an emphatic way as to deserve further aid in the new Morrill bill of 1890. Many of them established courses shorter than the four years' course which had been handed down to them from the older colleges, and they sought degrees that were of lower significance than the old degrees. Often they required less preparation of those entering into the more practical lines of work than was asked of candidates for the severer courses, which were still kept to give proper dignity to the institution. Their aim was to turn out men who could actually do something; who could apply their knowledge to some useful purpose, even at the sacrifice of that mental culture which comes from the mastering of the principles of a science.

There was a complete shaking up of the older courses of study and a recasting of the forms of education offered to the youth seeking training in the college. The time-honored classical course was rendered more useful by giving enlarged attention to the English language, by the introduction of rational methods of study to history and science, and by the addition of one or more modern languages.

A scientific course, with or without Latin, was organized parallel with the older classical course; but at first the requirements for entrance upon the newer course were often less than were demanded from a candidate seeking admission to the older training. By reason of the poorer preparation for their duties, students in the latter course performed their work in an inferior manner, and, of course, received an inferior training. Even after entering college upon a lower plane than the classical students, often the course was completed in three years, thus making the degree given to be regarded as much inferior to the old-time bachelor of arts.

The degree of bachelor of science, or sometimes the degree of bachelor of philosophy, was introduced for such students as had completed the so-called "scientific" courses of study. This degree had very unfortunate treatment in its early history, but it soon recovered its standing when the colleges asked of the candidates for graduation preparation as severe and as extended as was demanded of the older course of study, and now it is held in the highest esteem. Candidates for degrees in the various scientific courses have as difficult work as the classical students, and while they do not pursue the same studies they receive the same degree of mental training from the severe exactness of their work and the broad liberality of their course. Even if something is sacrificed in not requiring so much specific attainment as is required of the classical students for admission, it can be more than made up by asking of the applicant greater maturity of mind and fixity of purpose.

If college courses are to be judged by the careers of the men who have taken them, we feel justly proud of the training that we have given in the courses of science, agriculture, and engineering. These men have measured up with the classical men in every duty and have stood shoulder to shoulder with their fellows in this preparation for life. They have not fallen behind the men who have studied the classics in culture, for that indefinable something that comes after years of association with great minds comes not less surely to the student of science than to the devotee of the classical literature of the world.

The new education, however, did not stop with the addition of one degree to denote the accomplishment of undergraduate training. It makes the head swim to contemplate the number and significance of the degrees given by American colleges. In the *Standard Dictionary* an attempt to give the degrees offered by the "leading universities and other educational institutions" occu-

pies nearly three whole columns—almost an entire page of that mammoth publication—and even then the list is far from being exhausted.

Every possible phase of education or direction in which it may be applied has its own degree; every occupation, calling, or business claims the distinction of a degree. Whether a single science is studied, or a group of sciences so correlated as to fit for some specific end, the completion of the study is followed by the granting of a degree indicating that the student has accomplished such course of study. It makes one dizzy to follow the great diversity of possible degrees to which such a plan leads.

The medical course in this country leads to an abominable system of degrees; but custom has so fixed the title of doctor as synonymous with the profession of the physician that it is hopeless to make an effort to change it. However, the physicians do not make any distinction of specialists, only having distinctive titles for dentists, veterinarians, and compounders of medicines.

The etymology of the term "bachelor" is not *baccalaureus*, fancifully derived from "bay berry," "the laurel-crowned one," but *baccalaureus*, originally *vacca laurius*—*vacca*, afterwards written *bacca*, and *laurius*, changed to *laureus* to conform to a fancy forced upon it—"cow driver," "an apprentice," or a soldier who has not yet risen to the dignity of carrying the standard. The word is thus peculiarly fitting for the first collegiate degree. A movement has lately set in that promises to reduce the number of degrees, and it is hoped that the land-grant colleges will unite in helping it along. All those colleges now require of the candidates who annually present themselves for admission to the college about the same grade of preparation. Men who are admitted to any work of lower order than the freshman grade are not looking forward to taking a degree, and those pursuing any course less extended than the four years' courses are sufficiently rewarded by the knowledge and training they have received.

The degree of bachelor of arts has been from the first the distinctive degree of the man who has studied Latin and Greek; but it has lately been given to the man who has studied Latin only. This degree, in my judgment, out of respect for this old custom, should be given to those two classes of graduates only. The degree of B. S. should be given to the graduate of any other course, and the studies in which he has specialized or the direction in which his profession lies can be added in his diploma. The B. S. degree should be put on the same level as the B. A. degree in preparation asked of the candidate and in the length and severity of the course leading to it.

Some of the engineers are making a special plea for a degree to be known as bachelor of engineering. They claim that this degree should be given after the completion of a course of studies so related to each other as to prepare the student for undertaking the complex duties of the engineer. They recognize that there are too many subdivisions of the modern engineering profession to give each its appropriate degree.

At first civil engineering, as distinguished from military engineering, had alone to be provided for. Soon mechanical and mining engineering, to be followed by electrical engineering, entered into the field, and now we have chemical engineering, sanitary engineering, textile engineering, landscape engineering, promoting engineering, and so on ad nauseam. Agriculture as an industry has the same claims as the profession of engineering, and it calls for a knowledge of science and training in its application as wide and as thorough as are demanded by any of the industries of life. Some colleges give the bachelor of agriculture, others the bachelor of the science of agriculture. The horticulturists, the pomologists, the agrostologists, and various other specialists may insist upon giving the degree of bachelor of the particular branch of agriculture in which the student has received his undergraduate training.

The only way to stop the multiplication of degrees is to come to some rational plan, and I am glad to see that most land-grant colleges have already put in practice the granting of only two degrees, the bachelor of arts and the bachelor of science.

To conclude, I think the land-grant colleges should limit their degrees upon the completion of an undergraduate course of study to the degrees of bachelor of arts and bachelor of science. The former degree should be given to the graduate of a course of study in which Greek and Latin, or Latin alone, of collegiate grade, formed a part of the regular work of the course. The degree of bachelor of science should be given to students upon the completion of any of the other courses, and it should be added in the diploma in what lines they directed their studies.

The degree is simply an abbreviation of the diploma, and the title merely indicates that the student has received the training of the undergraduate course of a college. The name of the college may with great propriety be included in parentheses after the degree. For the second degree resident graduate study or successful practical work should be required, and then the degree should be in keeping with the work that has been done.

A. B. STORMS, of Iowa. The tendency of the older eastern institutions is to simplify the matter of degrees, as the paper states, and there is evident necessity for this. Originally the bachelor of arts degree implied that the student had pursued a certain well-defined course of study, the courses of study leading to the degree being limited. It was assumed when this degree was given to a man that he had studied Greek and Latin, or at least Latin. With the growth of scientific studies, however, there has been a great enlargement of the curricula of the schools, with a multiplication of bachelor degrees of various kinds. I do not think the bachelor of science degrees are sufficiently definite as significations of the courses pursued. I would like to add the designation of the line of study, as, for example, bachelor of science in agriculture. Bachelor of science means that a student has pursued the general scientific course. When we give the degree of bachelor of science in agriculture it means the student has pursued the agricultural course, and I think that is essential. I do not believe you can radically change the degrees that are already fixed, like those of engineering, veterinary medicine, etc.

H. C. WHITE, of Georgia. I suppose we all recognize that no baccalaureate degree should be given except on the completion of a course of study reasonably satisfactory to the faculty as indicating that the man who pursued it has had a certain amount of general training in which there may have been certain special lines of work. Now, the difficulties that have confronted the faculties—certainly the difficulties that have confronted our faculty through our entire history—is to determine just what lines of special work we shall admit for our baccalaureate degrees. It of course touches the broad question which was in part discussed at the National Association of State Universities the other day as to how far professional training might be admitted into the years of the man's college course usually dedicated to his undergraduate work. In our technical courses in the sciences I fancy we have less trouble with the degree given of liberal arts. We have less trouble because some of our technical sciences are pedagogically of such value in science training that we have had no great difficulty in permitting our undergraduates to take certain lines which might be regarded as specialized lines. Now, assuming that they may take these various specialized groups in agriculture, or even in pure sciences, or the application of pure sciences and chemistry—we have such an instance in our own case, that of engineering—that the faculties are careful that the number of years which are dedicated to the undergraduate work shall include just the study which will give the man the necessary mental training and discipline to put him side by side with the man in the liberal arts course: that is to say, in the general collegiate training, we started out by differentiation in the name of the degree. We gave the degree of bachelor of engineers, and also bachelor of agriculture, and we gave the degree even of bachelor of chemical science at one time, and the tendency was to differentiate in the name of the degree. We found there was one effect of this in the mind of our students. When a man came and entered, for example, he would enter in the freshman class for the degree of bachelor of engineering. Before he passed into the sophomore class he would want to substitute this or that or the other study for something we thought better for his general training in the freshman work, and so eventually we came to the conclusion—and it is a conviction with us, because we have now

tried it for a number of years—that it is safer to give the general degree of bachelor of science to every man who completes any one of the courses of studies. But we do follow the suggestion of Professor Storms. If it is desired by the graduate, we will indicate under the name of the degree “in agriculture,” or “in engineering,” or “in electrical engineering,” but that is all we do designate. We give the degree of bachelor of sciences only, and indicate, as I say, whether agriculture, or civil engineering, or electrical engineering. I do not contend that is the best way, but of course it would be scarcely proper for me to undertake to discuss a paper and insist on something that we do not do ourselves. I rather think that is the safest thing to do at present. First of all, I think we certainly ought to insist that the degree should not be given to any man until he has had that amount of training and culture which will at any rate equal that he would get in the college of liberal arts. You can scarcely get the bachelor of arts man as yet to yield equal dignity to the degree of bachelor of agriculture. The degree of bachelor of science has come to be about as well established as the old bachelor of arts, and therefore I think the safe plan is to give the degree of bachelor of science with or without the inscription after the degree which would indicate the particular course.

Mr. BAILEY. The practice in the college of agriculture of Cornell University is not one that commends itself to me. I think the distinction raised by President Storms between general academic degrees and professional degrees is a very important one to keep in mind. We have professional degrees of civil engineer, and mechanical engineer, and doctor of veterinary medicine in our institution, as in others, and they stand for training in certain professional lines of work. In the university they give to the graduates of the college of agriculture the degree of B. S. A., hoping thereby to designate our belief that the college of agriculture is a professional college and is a college which leads to liberal culture, giving one of the two coordinate degrees that stand for liberal education, B. S. and B. A., B. A. standing for the culmination of the work up through the languages and B. S. for work up through the sciences. We differentiate from the old B. S. by adding an A. B. to it, and the whole title is bachelor of the science of agriculture, which I do not like. I should much prefer to have the degree bachelor of science in agriculture. There is a science of agriculture as distinct from other sciences. I think the important point for us to discuss and bear in mind is this: Is an agricultural course a professional course in the same sense as a legal or civil engineering course, or is it a course, as you say, of the liberal art course, which leads to a bachelor of science degree (or to the bachelor of arts degree), as distinguished from professional degrees? My own feeling is that in our own case, at any rate, the agricultural course should be considered to be a general culture course rather than a strictly professional course; that we should give it the title and designation of bachelor of science. I am very willing to add the designation of the course of study, as, for example, of bachelor of science in agriculture, and for all the different lines in which the degree is earned. It has been suggested that an agricultural student on graduation should get the degree of agricultural engineer, which perhaps would be abbreviated A. E. In other words, there is a tendency, I think, in some quarters to regard agricultural work as strictly professional work. I should think that unwise. I should prefer to give a general B. S. degree with the subordinate designation.

Mr. THACH. We have been established for some time as a scientific school. We have four or five courses in engineering, a course in agriculture and chemistry combined, one in chemistry, and one in mining engineering; in all, about eight specific courses. We confer only one degree absolutely, and that is bachelor of science. We regard that as specific and thoroughly well differen-

tiated. I should like to see the land-grant colleges give one degree and require four years' good work, with as much language as possible for a well-established degree of bachelor of science. We designate in the diploma bachelor of science in certain courses, but we print and advertise the man as a bachelor of science. I do not see any use of being ashamed of that; it differentiates the modern theory from the old theory. I would like to see it done universally as far as possible. We also give the professional degrees of civil engineer, mechanical engineer, or electrical engineer, and so on for postgraduate work. I remember the time when B. S. was regarded as a little inferior, and men were clamoring for the A. B. degree for scientific work. But that confuses matters and does not indicate just the line of work pursued. We give one general B. S. degree, and later a master of science degree of the professional degrees as stated.

ELECTION OF OFFICERS.

The hour for election of officers having arrived, President Nichols, of Kansas, nominated President R. W. Stimson, of Connecticut, for chairman of the section, and President Fellows, of Maine, nominated President K. L. Butterfield, of Rhode Island, for secretary. There being no other nominations, the secretary was by vote directed to cast the vote of the section for these gentlemen for the offices named.

For members of the executive committee there were nominated Messrs. H. C. White, of Georgia; W. O. Thompson, of Ohio (who withdrew his name); E. R. Nichols, of Kansas; J. L. Snyder, of Michigan; L. H. Bailey, of New York, and J. C. Hardy, of Mississippi. On a ballot being taken Messrs. White, Snyder, and Bailey received the highest number of votes and were declared elected.

ACTION ON RESOLUTIONS.

The resolutions on cooperation between the stations and the United States Department of Agriculture (see p. 62) were read and approved by the section, as required by the constitution in case of all questions of administrative policy.

The resolution of Director Armsby regarding appropriations for stations and in support of the mining school bill (see p. 43), and that offered by Dean Davenport, relating to the extension of the franking privilege to engineering experiment stations (see p. 64), were also approved.

A similar resolution regarding the franking privilege for extension work publications (see p. 64), offered by K. L. Butterfield, of Rhode Island, was adopted.

The section then adjourned to meet after the evening session of the general convention.

EVENING SESSION, WEDNESDAY, NOVEMBER 2, 1904.

The meeting was called to order at 9.45 p. m. by the chairman, W. E. Stone.

WHAT CAN AND SHOULD BE DONE TO INCREASE THE INTEREST IN AND APPRECIATION FOR THE AGRICULTURAL SIDE OF TECHNICAL EDUCATION?

J. L. Snyder, of Michigan, presented the following paper on this subject:

The oldest agricultural college in this country will celebrate its fiftieth anniversary three years hence. At the opening of this college, and for many years thereafter, there was very little systematized knowledge which could be taught to students in theoretical or practical agriculture beyond the ordinary operations of the farm familiar to every country boy. The knowledge of science as related to agriculture was very meager and was not systematized nor in such form as to be readily used in class instruction.

Farming was a very simple operation in those days. Professor Hamilton tells of an inventory of the farm machinery and implements in use on one of

the best 200-acre farms of Pennsylvania fifty years ago, the full value of which was \$73.50. The equipment on such a farm to-day would be worth from \$1,000 to \$3,000.

In those early days students were given almost the same work as offered by the scientific department of other colleges. The instruction in agriculture was given in the field, largely by performing the ordinary tasks of clearing, ditching, fencing, and tilling the soil.

From this chaotic condition agricultural knowledge, by the arduous efforts of a few able men, began to expand and develop, certain subjects became prominent, and information relating to these subjects was systematized and gradually worked into such form as to be readily adapted to class instruction. This fund of information, both practical and theoretical, has been added to and enriched year by year. Under scientific, painstaking instructors it has been worked into pedagogical form, and courses of study with science as a basis have been developed, until at present the agricultural side of technical education can present a respectable appearance in the educational world.

More has been accomplished during the last decade than was accomplished during the four preceding. Until very recently technical courses in agriculture could not rightfully claim equal standing with technical courses in medicine, law, or engineering. At present, however, many institutions have placed certain courses in agriculture on a par with technical courses in the subjects just mentioned.

It is not claimed that all courses in technical agriculture should be of this grade, but if they are offered as four-year courses leading to a degree they must give the equivalent amount of work for that degree or lose the confidence and support of educated people in other callings and professions.

The agricultural side of technical education to become popular and meet with success must have the support of the most intelligent and best people of all classes. It is of the first importance that public school teachers, professional men, and the leaders in all lines of learning and industry shall have a favorable opinion of the work offered in these courses. They can know but little in detail of the work offered, but they can and do know, in a general way, whether the institution or department is turning out men who are prepared to rank with other college men in general training and development, and who are able to fill well the positions intrusted to their care.

To gain and maintain the confidence of the public technical courses in agriculture should be clearly outlined. No work should be placed in a course which the institution is not prepared and ready to give. It is pernicious and dishonest to outline subjects and courses in a catalogue or yearbook which the professor in charge knows will not be called for or the department is not prepared to give, however great and pressing the demand. The public can not be long misled by printed outlines.

The object of each course should be clearly stated. There is a useful and legitimate field for short courses and special courses from one week to four years in length, but let the object be so definitely stated and the work so clearly outlined that no one will be misled thereby. If the course is to lead to a bachelor's degree, let the requirements for entrance and the time and work required be such as to compare favorably with other technical courses leading to the same degree. One of the quickest and surest ways of discrediting a good thing is to make it cheap—cheap in the sense that it can be secured for a less amount of time or labor than is required elsewhere for the same article. The demand for a cheap article in education comes from those who usually are of little credit to an institution after their course is completed. The good students are not looking for soft snaps. They do not desire to enter the course which requires least for entrance and the minimum amount of work for a degree. Many good men have been lost to agriculture because they were too proud to enter upon a course of study tabooed and laughed at by students in other departments, largely on account of the inferiority of the work, both in quantity and quality, as compared with that offered in other departments. Happily these days in most institutions are past.

Courses must be technical. Their object is to impart specific information for definite ends. General culture is a laudable acquirement, but it must play a secondary part in technical courses. In the early stages of agricultural education courses of study embraced many subjects which, while good in themselves, bear no close relation to either the science or art of agriculture. They must give way to subjects which are more specific and technical in character.

In other words, technical courses in agriculture must become in character similar to the courses now given in medicine, law, and engineering.

But every technical subject should prove its worth before being given a definite place in the course. A small section only of the great sphere of knowledge can become a part of the curriculum. The man in charge of a subject is not always the best judge as to the prominence such subject should be given in a course of study. His nearness to the subject usually distorts his vision. Better let good courses in advanced English, history, and political economy remain in the curriculum for the present rather than displace them for technical courses which are half-baked, poorly arranged, and do not form a definite and important place in the sequence of studies.

Technical courses in agriculture, in order to have and hold the respect and confidence of educators and educated people, must be in charge of scholarly, well-trained men. These men must compare favorably with teachers in charge of other departments of college work. Narrow, conceited enthusiasts may, for a short time, with hobbies which in themselves are good, gain the attention of the public, but in the end they do the cause of agricultural education harm. Students, even more than the public, are apt to measure the value of a study by the scholarship, dignity, and magnetism of the man who imparts said information. There is a proper place for overalls and rubber boots. It does not lessen a man's standing or dignity to wear them when necessary, but there is no virtue in them per se. The class room for students in practical agriculture should be a model of neatness, cleanliness, and order. It should ever be kept in mind that the first object of education, and even of technical education, is to make men. There is a great danger that too much emphasis may be placed on the commercial value of such training. A distinguished educator, in looking over the equipment of an agricultural school a few years ago, remarked that everything that was shown him and every word said by those in charge emphasized the opinion that the sole object of the institution was "to teach young men how to grow more corn to feed more hogs, to buy more land to raise more corn, etc."

Even short-course students should receive some intellectual awakening. They should be introduced to books and, if possible, led to see that "we live in deeds, not years; in thoughts, not breaths;" and that "he most lives who thinks most, feels the noblest, acts the best." They should be taught that, after all, the greatest enjoyments are intellectual. No man compelled to labor for a living, as we all are, has greater opportunity to feed his intellect from the great storehouses of science, history, and literature than the "man with the hoe." He should be given an inspiration to look up. Hence the great necessity that teachers of agriculture should be men of broad culture and inspiring personality. They should know much more than the subjects which they are required to teach. They should be college-bred men in the fullest and broadest sense of the term.

It is to be very much regretted that so many able teachers of agriculture seem to feel that they must make their reputation outside of the class room. They write for the papers or carry on experimental work, while the students, who have been attracted to the college largely because their names were printed as teachers of agriculture, labor on under the instruction of young, inexperienced subordinates. There are other bright young men in agriculture who are endeavoring to find a crosscut road to success. Class-room work is too slow for them. They seem to imagine that they can, through the agricultural press, boost themselves into notoriety and fame. Very short-sighted policy. The men whose good opinion and confidence they must secure before promotion comes are entirely too wise to be misled by any such process. Young men must learn not only "to labor," but "to wait."

Again, if agricultural education is to attract and hold the attention and confidence of educated people, it must be accorded equal advantages in equipment and buildings with the other departments of the colleges or universities. A good building in a prominent place on a campus has a great influence in establishing in the minds of students and the public a high regard for the department so housed.

In most States it has been very difficult to provide buildings and equipment necessary to meet the demands made by those desiring higher education along the older and established lines of work. As there were few students in technical agriculture, buildings were erected to meet the needs of the greatest number. Agriculture usually came in last and got little. This had a tendency to belittle it in the eyes of the people and

worked great injury to the cause of agricultural education. It is not the function of a university or college maintained by taxation to simply meet the present demands, but it should rather stimulate and create demands for such types of education as shall contribute the greatest good to the Commonwealth.

As the industry of agriculture is fundamental, and as our Government, in recognition of this fact, makes annually large appropriations for agricultural education, it is the plain and imperative duty of all land-grant colleges to build up strong, independent departments of agriculture and to encourage young men in every way possible, even to the remittance of fees, to make a thorough, scientific study of this subject. Short courses should be provided for those unable to take the longer courses. Through the experiment-station bulletins and farmers' institutes, knowledge of practical, everyday problems should be brought home to the farmer who is unable to avail himself of the advantages offered in the class room.

If the agricultural department of a university or the State agricultural college, in equipment, buildings, teaching force, and courses of study, is such as to command the respect of all thinking people, how can the interest in and appreciation for the work of this institution or department be increased?

It was the intention of the writer at one time to prepare an answer to this question from information furnished by the various institutions engaged in this work. But after preparing a blank asking for specific information on twelve or fifteen points, it came to his attention that there were at that time several such blanks on his desk unanswered. His heart failed him and he decided, even at the risk of unfavorable comment, to give briefly the methods used by his own institution in bringing before the public, and the farmers in particular, the advantages that institution has to offer to the young people of Michigan.

It may be proper to state at this time that this college has always maintained very friendly relations with the public schools, and especially the high schools of the State. Members of the faculty belong to the State teachers' association and have an extensive acquaintance among public school men. This has, in many ways, contributed to the growth and stability of the college.

For advertising purposes \$2,000 is set apart each year. This is expended through the president's office and almost entirely within the confines of the State. Methods differ somewhat from year to year. As an indication of the plan ordinarily pursued, a brief outline of the work done last year will be given:

About the 1st of January the college calendar was issued. This gave views of buildings, landscapes, laboratories, interior views of laboratories, etc. An edition of 6,000, costing about \$325, was distributed to all the high schools of the State, alumni, newspapers, State officers, country ministers, and the leading agriculturists of the State. The college has issued a calendar each year for the past seven years and the results from this source of advertising have been very satisfactory.

The college issues quarterly bulletins in editions of from 5,000 to 10,000. The first edition is issued in February. This gives the programme of the round-up farmers' institute, together with information concerning the college, and especially the agricultural department. This is mailed to all the officers of the county institute societies and to those who have in any way been interested in the work of the institutes, also to other prominent farmers throughout the State. The proceedings of the round-up institute are printed and issued as a supplement to the February bulletin. Ten thousand copies are in this way distributed among the farmers of the State.

The May bulletin is designed to give information to young people who may be induced to enter our long courses. These are sent to the members of the senior class of each high school of the State and to several thousand other young people whose names we have collected from farmers' clubs, granges, country ministers, alumni, old students, and various other sources. To this list of names are sent also several special editions of our college paper, including the commencement number.

The August bulletin is also sent to this list of names, as well as to all likely to be interested in the excursions to the college. It gives information concerning these excursions, which take place during the third week of August. Four railroads enter Lansing. One railroad is given two days for excursions, the other three one day each. We arrange several months beforehand with each railroad, having an understanding as to the territory to be covered and the rates to be charged. The railroad furnishes the college printed matter advertising the excursions. We mail this to all the granges, farmers' clubs, post-

offices, newspapers, former students, and prospective students, and others interested within the territory to be covered by the excursion. As one railroad has a branch leading to the college, these excursion trains are run into the campus. We send student guides in uniform out 20 or 30 miles to meet the trains and distribute little maps of the college grounds with specific information as to what can be seen in each building. Buildings are placarded and numbered. There are also on the campus a number of students in uniform ready to show people about. A number of wagons carry visitors through the experimental plats and orchards. Every department of the college is open with one or more persons in charge. Sideshows, agents, and fakirs are not permitted on the campus. Meals are furnished on the grounds at reasonable cost, but the visitors bring baskets of food with them and eat from the tables provided under the beautiful shade trees. These excursions are patronized almost exclusively by farmers and their families. Many of them return each year with the annual excursion and always seem to be much interested. About 8,000 people annually visit the college on these occasions. The excursions are of no expense to the college except the small sum paid out for guides and a little printed matter and postage. Many students who expect to enter take advantage of these excursions to visit the college and make arrangements for rooms and board.

Soon after the fall term opens arrangements are made to advertise the short courses given during the winter. Names are gathered from the farmers' organizations, institute workers, census enumerators, crop reporters, creameries, cheese factories, and old students. The November bulletin gives an outline of the short courses and all information desired by those wishing to enter. Ten thousand copies are distributed for this purpose. Special editions of the college paper are also mailed to prospective short-course students. These special courses are also advertised in the agricultural papers of the State for one or two months during the fall. The long courses, during the summer months, are advertised in the religious papers of the State.

Occasionally special measures are taken to advertise the institution. Recently 200 Junior Annuals were sent to as many of the best high school libraries throughout the State. Last year our department of entomology sent to each of our leading high schools a box of specimen insects valued at \$10. The endeavor is to do systematic, careful, conservative advertising. No particular subject or department is boomed at the expense of others; no member of the faculty is given an opportunity to boost himself and his department unduly. All endeavor to work together for the upbuilding of the institution. We work in harmony with the other institutions of the State. We are within the shadow of one of the great universities of the country, having at present in its campus over 4,000 students. This greatly increases the difficulty of securing students, yet we have all and even more than we can take care of properly with our present equipment. We hold strictly to the technical idea. Every male student is required to take either agriculture or engineering. We do not offer literary, classical, or general science courses. We advise students desiring such work to attend some other institution.

We try to show in our work and in our advertising that we have faith in agriculture and in agricultural education. We plead for a higher ideal and a higher life for the tillers of the soil. We believe that this uplift will only come through education.

There is one line of work not touched upon in this paper which would undoubtedly do much to arouse interest in agricultural education—namely, that of the teaching of nature study or elementary agriculture in our public schools. The experiences so far in this direction are not very encouraging. It will take a long time to make elementary agriculture or nature study a component part of public school work. It calls for a class of instruction which is far beyond the ordinary teacher of a public school. The time may come, however, when teachers for this work will be thoroughly trained and will be able to arouse interest in students such as will prompt them to attend the higher institutions of technical training.

What can and should be done to further agricultural education?

- (1) Make our agricultural schools and colleges such as to draw the young people from the farm.
- (2) Encourage and assist in the introduction of elementary agriculture into our district schools.
- (3) Encourage the establishing of country high schools in which the teaching of agriculture will be a prominent factor.

(4) Impress upon the public, and particularly the rural population, through the press, from the platform, and in every other effective way, not only the great advantages of technical training in agriculture, but also the freedom and pleasures of country life.

We should remember that it has taken many, many years to develop the strong sentiment which prevails everywhere in favor of higher education. The pulpit, the press, and every intelligent force has been emphasizing the advantages of higher education for centuries. It may take many years to develop among the farmers of this country a strong sentiment in favor of agricultural education. We should feel encouraged with the results so far. What other great educational movement has made such rapid strides? The outlook is hopeful. Let us not grow weary in well-doing.

E. DAVENPORT, of Illinois. It is pretty well understood, and has been for a good many years, that the technical portions of the courses in our agricultural colleges are not quite so interesting to students as some other subjects taught. This has been due in many cases to the lack of men to properly develop the subject of agriculture, although the idea that the difficulty of giving good instruction in agriculture is due to the nature of the subject has not entirely passed away. The organization lists of the land-grant colleges show a tremendous difference in the number of instructors in agriculture, the figures varying from two-thirds of a man to over 20 men in different institutions. So far as I know the interest in agriculture in these institutions on the part of the student is about in proportion to the number of men who are teaching the subject. Excluding household science, which is hardly in the field we are discussing, the college of agriculture of the University of Illinois offers 73 courses in agriculture. Of these, 67 different courses are actually taught this year. The proportion of technical to nontechnical work has something to do with the interests of the student. I think we ought to consider whether a student should spend one-half or one-fourth of his time in agriculture. In our institution we expect him to spend one-half his time in this subject, but our object is to teach subjects, not to conduct students through set courses, the student making up his course of study out of courses of instruction offered by the institution. The students demand these specialized courses, and are demanding that they shall be still more specialized. We used to have a subject we called stock judging, in which the student was to judge horses a while, then cattle, then sheep, and then hogs, and we thought that was a proper unit. We learned that some students were especially interested in one kind of animal and not in the other kinds, and so we divided the subject. We put the light horses in a class different from the heavy horses, the beef cattle different from the dairy cattle, and we separated the sheep and hogs. We have men following each subject. To a man who is to be a producer of beef or a breeder of beef cattle information about dairy cattle is the veriest rubbish. Technical instruction to be of any consequence or interest to the student must be directly applicable to the business in hand. The student ought not to be required to waste his time with the kind of technical instruction which is of no use to him. It is our purpose, therefore, to so shape the courses that each student shall get the particular kind of technical instruction he wants or needs for a definite line of work. The problem before all of us is to so man the agricultural departments that we can not only teach the stock knowledge we have in hand at the present time, but can develop new sources of information. The unit is the subject to be taught, and not the numbers to be taught. If the agriculture is simple it takes fewer men, but if it is mixed it will take many men. It will take men enough to develop the subject, irrespective of the students. We now have more teachers of agriculture than we had students five years ago. And the contention was then we did not need any instructors until we had more students. I said, we will never have more students until we have more instruc-

tors. The moment we doubled our instructors we doubled our students, and so it will be everywhere. These students know what they want better than we do.

For years we temporized with the matter because we thought if we had few students we only needed a few instructors. It is as much trouble to teach one as a hundred. When I was a student of agriculture there was very little literature and no bulletins. If you had had 20 professors of agriculture twenty years ago there would have been, apparently, a great waste of money, and yet we would have got along much faster if we had been able to increase our numbers earlier. I read a report on household science the other day, written by a body of intelligent women, who undertook to say that household science some day would be a great subject in universities, but that no subject could be attempted by a great university until it could go in with all the dignity of any other subject and be as well taught as any other subject, and I said it would never get into the university then. Agriculture would never have gotten into any university or college if it had not begun until it was perfected. I am of the opinion that it is in the universities of to-day that agriculture has the best opportunity, because the theory of the university is that every department in it may offer all the courses that the genius of its men will permit, that the department may do just as much in the way of expansion and in the way of courses as the money at its command will make possible. The theory of the college is, on the other hand, that there is a set course, and when the course is full there is no chance for expansion. That is likely to be true of the independent agricultural college. As a rule colleges have set courses, and as a rule universities do not. Until agriculture can have in the colleges of agriculture that are distinct from universities the same opportunity for extension or subdivision as there is in universities generally it will be hampered in its development. I believe that every institution, whether a university or college of agriculture, should give the agricultural department every opportunity to divide and subdivide, and supply it with plenty of men and money. In the agricultural colleges there must be almost unlimited election in agriculture, because such technical work must be elective. Agriculture, in order to prosper, must have almost unlimited means, unlimited numbers of men, and unlimited privileges.

W. M. HAYS, of Minnesota. You say you divide the work about half and half. How do you arrange this?

Mr. DAVENPORT. If a man graduates from our university he takes certain prescribed studies. Those are arranged so that half are agriculture and the other half not agriculture. He has about one-fifth of his time to use as he pleases. He can make it a little more than half technical, or he can make it exactly half technical. We distribute the technical from the first year until the last. The student takes some agriculture from the first. Our courses are so arranged that if the student follows our advice he begins agriculture, science, and literature when he enters the university.

Mr. BAILEY. There is a point of view which I would like to suggest, which I think marks a wide difference between the practice of the agricultural college of the University of Illinois and some of the other institutions of similar grade, and that is whether some of these courses, looked upon as more directly professional, are not fitting men for rather narrowly specialized vocations in life, whereas others of us are teaching broad agricultural courses, which are intended to fit a man for the undertaking of the larger affairs of agriculture and of country living. In our own college of agriculture we do not expect to fit a man for the technical work of stock judging, or the technical work of corn breeding, so much as we do to educate the man and to fit him to be a strong and resourceful man and able to take up any particular kind of work he wishes to later in life.

Mr. DAVENPORT. I may say that in the University of Illinois the college of agriculture is not a technical college in the sense the engineering college is. An engineering course is an absolutely set course, and has little or no time for the language, literature, and other of the nontechnical subjects which are required for graduation in the agricultural course. The demand for engineering students is so large, the public calls for so much technical information at once upon graduation, that they are compelled to devote practically all the time of the college course to strictly technical training.

Mr. HENRY. Assuming it is right to train an engineer that way, I think the same is true of agriculture. The engineering course has been longer in developing and has had more highly trained men than agriculture.

The CHAIRMAN. It is not necessary to succeed in agriculture that a man should have the same training that is required in engineering. You all know very well that there are hundreds of farmers making a good living and making money who have had no technical training in school at all, and there are going to be such men for a good many years to come. That is, the conditions are such in agriculture in this country that an uneducated farmer can acquire land, make money, and succeed at farming. That can not be done in engineering. Neither is it profitable to give him training in engineering of the brief superficial kind which you can give men in these technical courses of agriculture. You can not accomplish successful engineering training without a good many years of mathematics. Mathematics is not required to get a degree in agriculture. So that I should say that a professional course of study in engineering involves a good deal of well-defined and clear-cut training, but that the course in agriculture is not yet on the basis of the professional course, although it is technical. I make that distinction. The trend of the discussion seems to be that it is not necessary to put the same amount of training into the engineer that it was into the agriculturist, in order that he may meet the demands of the day, but I do not agree with that, because the farmer can meet the demands of the day and not have a bit of training, and there are hundreds and thousands of farmers doing that every day; but there are not many successful engineers who have not had a pretty thorough training.

Deans Henry and Davenport dissented from the position that untrained farmers are succeeding in any proper sense or complying with the condition of good agricultural practice, that they shall occupy the land and leave it as good as they found it.

Mr. HENRY. The San Joaquin and Sacramento valleys have been practically ruined in the last thirty or forty years. The State of New York has areas in it that have been robbed of their fertility by improvident culture. In Europe I have traveled over lands that were probably cultivated in the time of Julius Caesar, and I saw wheat there yielding as high as 60 bushels to the acre. In America we have skimmed over the land and taken the best of its fertility. People buy land and when they ruin it, or get it up to a certain price, they go to another place. This is due both to lack of technical training, and to the business idea of getting the money out of the land and leaving it.

It will be found, I think, that the unschooled men who are making a success of farming are nevertheless self-educated men, and in a way are as well educated as the engineer is.

Mr. DAVENPORT. The engineer has got to meet the demand of the trade. The farmer also has to meet the demand of the trade, and in addition he has to meet a certain demand of the State. This generation of farmers must not be permitted to occupy to the disadvantage of the oncoming generation. There is a broader demand on the farmer than rests upon the engineer.

C. F. CURTISS, of Iowa. I believe that in our agricultural work we are tending strongly toward training the farmer the same as we do the engineer. We are loading our courses of study up with more and more technical work every year. We are going to be very soon on practically the same basis. It is true we have not had that heretofore; we were not in position to get it; we did not have the technical men in our faculty. The conditions are getting to be such that the young farmer is going to be obliged more and more largely each year to sell his services on the market, just as the young engineer does. I think less than 50 per cent of our agricultural students are in such circumstances that they can return to farms of their own proprietorship, or likely to come to them by inheritance. There is going to be an increasing demand for the young men who have had the thorough technical and practical training which renders them capable of taking charge of a farm, as an engineer takes charge of a plant, and making it a profitable investment for the owner. The demand is more largely for thorough training in agriculture. And I believe we are going to load up our courses (and some of the institutions have already encountered the difficulty) so fully with agriculture that there will not be room for mathematics, science, and the culture studies. These studies are giving way and must give way more largely in the future than they have in the past to technical agricultural studies.

Mr. BAILEY. To all requests for men to take charge of large agricultural enterprises I always reply that we can not send recent college graduates to fill such positions. That is not the way the agricultural student is trained. The engineering enterprises are organized enterprises. The young man goes to do a special piece of work under direction, whereas the agricultural student who takes charge of a 250-acre orchard, for example, not only has to direct the technical work of spraying, etc., but he has to do with the management of men and other executive details, and that demands experience. The engineer who is the manager of men is the one who has been out of college two or three years, and therefore has had experience in the management of men.

I sometimes wonder, when we are splitting up our agricultural courses into small units, whether we are not overloading them with very minute divisions of subjects and are not likely to substitute training for education, mere technical, manual, and special skill for real mental power.

So far as we have organized industries in agriculture, as we have in engineering, I think the educational demands are parallel to a large extent, and the experience of the engineer is useful to us. So long as the larger part of the subject of agriculture is unorganized, I do not see how we can adopt the kind of training the engineer receives. I suppose, as time goes on, we shall find increasing demand for particular and technical special lines of training for the agricultural man.

J. L. SNYDER, of Michigan. The inference which could be drawn from the remarks made might lead one to think that the engineering courses were almost entirely technical and that our agricultural courses were at least half liberal or included subjects that would give discipline. We all know that our engineering courses are exceedingly strong in mathematics, and we also know that the disciplinary value of mathematics is very great. In addition to that, engineering students must have a good knowledge of English. If they do not have it when they enter the school, they must get it afterwards. Engineering graduates are well trained in English. They must also have considerable science work. On the whole, our engineering courses give very good disciplinary training. On the other hand, if we make our courses in agriculture thoroughly technical, we lose the disciplinary value that is attached to the courses of engineering. If we divide up our courses in agriculture as finely as some have recommended, I think that to a large extent the disciplinary value will be lost,

and we can not afford to do that. First of all, we must have men of some power. A man may know all about agriculture, or certain subjects in agriculture, and still be so lacking in power as to be worthless. We must not forget that, when we divide up our courses in agriculture into such small fragmentary pieces, we lose the continuity of study and that close application a student must give, for example, in preparing his work in mathematics. We throw away the great value of our enlarged courses, and we can not afford to grant degrees on any slipshod or fragmentary course of instruction which fails to give the great power and development that comes from a good four years' college course.

Mr. BAILEY. You would distinguish, then, as I understand, between the training-apprenticeship idea and the pedagogical idea as the result in teaching?

Mr. SNYDER. Yes, sir.

Mr. CURTISS. Do you not think that a student who thoroughly masters these technical subjects from start to finish gains power by it?

Mr. SNYDER. That depends very largely on how they are taught. I do think that technical subjects can be presented in such a way as to give power, but I fear that if a student is allowed to enter college and select his work wherever he pleases and whatever he pleases that he will lose to a great extent that valuable training he would get from a systematic course laid out by an older head than his own. He must have a certain amount of English and a certain amount of science work back of his training. It is usually better to have the scientific training first. At one time we thought that the only way to do was to give the science first and the practical part afterwards. Now that view has changed largely, and in a great deal of our work I think the two come pedagogically together. But the student must have a scientific basis for his technical work, for the latter is not all art; there is a science behind it, and if he is going to receive thorough training he must have a foundation in science. I do not believe he can receive such an education as we expect four-year men to have, the men who receive a degree without thorough training in chemistry, physics, and the other natural sciences. I do not believe you can give a man an education which would entitle him to a degree simply by giving him the art without giving him the sciences.

Mr. DAVENPORT. But is there not science in the subject itself if it is well studied and well taught?

Mr. SNYDER. I think a great deal of this technical work could not claim to be strictly scientific. Of course it may be based on scientific principles, but if the student is not familiar with the sciences, he simply commits the definitions as based on science.

Mr. CURTISS. I wish to distinguish between splitting up a course into small fragments and concentration. I think that distinction should be clearly made. Take, for instance, the animal-husbandry training given in our own institution. We have separated the animal-husbandry training from the other training and established an animal-husbandry course. We have supplemented it with the scientific training that bears on the subject. We have also established a course in horticulture, reinforced with the greatest possible amount of science which bears on horticulture, and so with all of our courses. Instead of splitting up into fragments, we have concentrated and strengthened the courses to the largest possible extent. As regards training, force, and power, I do not believe the students have suffered by that kind of concentration where the subjects are properly related and the underlying sciences taught. In our institution the engineering courses are concentrated and rigid, and we are making our agricultural courses more and more of that type each year. The engineering courses have but very little of the general culture studies, the agricultural students

have less of mathematics, but they have more of the sciences, and they have the technical studies which closely border on sciences when taught properly.

Mr. DAVENPORT. I believe thoroughly that there is a scientific way to teach agriculture when we can find it. It is unscientific, I believe, to say to a man who wants to study beef cattle that he must first study sheep. We must try to meet the demand scientifically. Find the unit in his mind and meet it with the unit instruction. Concentration is the object sought, but let the technical training be done in the most scientific way possible. Of course, if the student changes his plans, the special information will be useless, and whether he changes his plans or not much of the information employed in the instruction will be discounted in a few years, but the training he receives, the attitude of mind, the ability to think and carry out a thing to its issue, will remain with him. The pedagogic idea is the main idea in it. If the student has announced his desire to study beef cattle, I should get him among the animals as soon as possible. I should let him understand he is studying beef cattle at once, but I should advise him to study chemistry at the same time. We require a year and a half chemistry before the student can study stock feeding. The moment he announces his desires we begin to frame up his course of study, and he works the whole thing together.

Mr. Henry referred to the rapidity of the growth of specialization in teaching agriculture since the agricultural colleges were first organized, and to his belief from the beginning that this would be the tendency.

After some further discussion the section on college work and administration adjourned.

SECTION ON EXPERIMENT STATION WORK.

AFTERNOON SESSION, TUESDAY, NOVEMBER 1, 1904.

The section convened at 2.15 p. m., Chairman E. H. Jenkins presiding.

On motion, the section resolved to have but two afternoon meetings, viz, on Tuesday and Wednesday afternoons.

ORGANIZATION OF A SECTION ON BOTANY AND HORTICULTURE.

The communication of F. L. Stevens, of North Carolina, filing an application from botanists and horticulturists, requesting that one of the sections of the association be devoted to their interests, was referred to the section for consideration.

On this subject L. H. Pammel, of Iowa, said:

I had an invitation from Professors Stevens and Rane to prepare a paper for this meeting. I was urged to be present to present a paper because on the interest manifested in the work would depend the organization of this section. I favor the creation of such a section, but I must confess the sectional meetings have not been entirely successful. I have attended five or six meetings of this association, but at none of these meetings did we have a large attendance of botanists and horticulturists. Inasmuch as this convention is largely a delegate convention, it seems to me it is rather expecting too much to have the station workers attend and pay their own expenses. It seems to me, however, that the station botanists and horticulturists have the right to know something about the working policies of the institution, as these are the matters most discussed. Under present circumstances you can never expect a large attendance from the station workers, outside of the director and president, who should by all means attend.

On motion of W. H. Jordan, of New York, the application was not granted.

FEDERATION OF AGRICULTURAL ORGANIZATIONS.

On motion of H. J. Wheeler, of Rhode Island, the chair was empowered to appoint a committee of three to secure, if possible, a federation of agricultural organizations in the individual States of the Union.

The chairman appointed on this committee H. J. Wheeler, of Rhode Island; C. D. Woods, of Maine, and H. J. Patterson, of Maryland.

UNIFORMITY OF TERMS USED IN AGRICULTURAL ANALYSIS.

Attention was called to the fact that the general session of the association had referred to this section the subject of nomenclature for fertilizer constituents. It was moved by C. G. Hopkins, of Illinois, and seconded by C. E. Thorne, of Ohio, that a committee of five be appointed to consider the nomenclature for reporting the analysis of fertilizers, soils, plants, and other agricultural products and materials; that this committee should confer with a similar committee from the Association of Official Agricultural Chemists, and report to this section at the next annual meeting.

The chairman appointed on this committee C. G. Hopkins, of Illinois; H. J. Wheeler, of Rhode Island; A. T. Neale, of Delaware; R. J. Davidson, of Virginia, and H. Snyder, of Minnesota.

PLANT BREEDING—THE SHAKESPEARE OF THE SPECIES.

W. M. Hays, of Minnesota, read a paper on this subject which was subsequently withdrawn.

B. C. BUFFUM, of Wyoming. One point brought out in the paper so ably presented by Professor Hays it seems to me was not given sufficient weight. In fact, he stated that a variety of apple was practically the same in any section in which it is grown.

The modifying influence of environment is very great. It is perhaps more strongly marked in the comparatively new arid region which I represent. In fact, my observation would lead me to suspect that the same "homozygotes" may have produced both the white man and the black man. A species supposedly fixed by careful and long-continued breeding when transferred to an environment very different from that under which it was formed soon becomes unrecognizable. I knew a case a short time ago of an apple which belongs to Professor Hays's species of the first class having no immediate modifying blood strains, as it is only a part of the parent, that was purchased by a western nurseryman from a firm in Missouri. The trees were sold to a farmer, and in five or six years, when they began to bear, the farmer sent samples of fruit back to the nurseryman to be named. He did not recognize the variety and sent the fruit to the Missouri firm, who, in turn, could not name the variety. It was sent to Mr. Taylor, of the U. S. Department of Agriculture, who reported that the apple must have been a Missouri Pippin, but its variation had made it almost impossible to recognize any characteristics of the variety.

The hard wheat when taken to the arid region from Minnesota begins to vary quite quickly, and in a few years the kernels of grain become very different. There seems to be a tendency on our arid soils, poor in nitrogen for glutenous wheats, to become starchy, and many of the grains take on a white, starchy appearance.

In live stock the same thing pertains. A son of Corrector which has been bred for heavy meat points in the chine and twist, if taken away from the corncribs and placed on a western range will begin to develop a form more nearly

corresponding to the American bison which formerly occupied the ranges. He becomes heavy in front and light behind.

What has been gained by breeding in one place may be quickly lost under changes of environment and State. This is one of the strongest arguments for the maintenance of experiment stations in the several States, where work can be done suitable and valuable to the different regions of the country. In order that the farmers can make intelligent use of the results of our breeding they must be informed of its importance and learn to select, in order to keep up the improvement. In general, undirected variation brings about deterioration. Varieties do not stand still, whether or not they are being acted upon by the powerful forces used in artificial direction of breeding, and every farmer should be well enough grounded in the simpler principles at least to enable him to make continued use of an improvement.

L. H. PAMMEL, of Iowa. A number of years ago I had the good fortune to have taken up this question of varieties of fruits. I was astonished to find the effect that climate has upon the development of fruit. The Duchess grown in Montreal is very different from the Duchess grown in Iowa. The Montreal apple was far superior in quality. Again, I found that apples succeeded best or had the highest quality when grown where they had originated. Thus, such varieties as Spitzenburg, Baldwin, Grimes Golden, and others have a limited distribution where they attain the best quality. I was astonished last summer to find in Montana that apples succeeded in regions where frequent frosts occur. In fact I was told that in the Bitter Root Valley on one of the streams they had set out an orchard of fruit trees above 3,000 feet altitude, where frosts occur nearly every week in the year. But take another side of the question, and that is an important one to consider in connection with the breeding of varieties. Take the variety of wheat that Professor Hays has produced in Minnesota. This variety has produced an increased yield in Minnesota, but the same variety tried in the State of Iowa did not show this increase in yield. Again we all know that plants when grown in climates not adapted to them begin to show the effects of disease. Some years ago when I was investigating the disease of oats, and especially the variety most subject to the disease, I found that the Texas Rust Proof oat was severely affected with rust, but it is said to have been rust proof in Texas. We know then that climate is an important factor and that each region must do its own work in connection with the production of varieties. The varieties of wheat that have succeeded best in Minnesota will not do for Wyoming, and so on.

Professor Hays's paper was further discussed by W. H. Jordan, C. D. Smith, C. A. Keffer, C. G. Hopkins, and H. T. French.

For further discussion of the subject of plant breeding, see page 119.

AFTERNOON SESSION, WEDNESDAY, NOVEMBER 2, 1904.

NOMINATION OF OFFICERS.

The chair was authorized to appoint a committee of three to present nominations for the officers of the section, including two members of the executive committee. The committee appointed consisted of H. P. Armsby, of Pennsylvania; W. A. Henry, of Wisconsin, and R. J. Redding, of Georgia. (For report, see p. 65.)

TOPICS FOR DISCUSSION NEXT YEAR.

On motion the subjects of soil investigation and of demonstration work by the stations were selected for discussion at the next annual meeting of the section.

PLANT BREEDING.

N. E. Hansen, of South Dakota, read the following paper on Methods in Breeding Hardy Fruits:

My purpose in this brief paper is simply to emphasize some of the points brought out in Bulletins 87 and 88 of the South Dakota station published this season. In crossing various fruits I have found it of decided advantage over the old outdoor method to do the work under glass. The trees, shrubs, and plants are raised in pots, boxes, or tubs for a year or two before blossoming time. In winter they are stored in a specially constructed tree cellar, where they are kept dormant and even allowed to freeze somewhat, with enough windows to afford some light. In late winter or early spring they are brought into the greenhouse, and the crossing is done when the flowers are ready. Only a small part of the blossoms are emasculated; the remainder are removed while still in the bud. No sacks are necessary, as a rule. As soon as possible the plants are put outdoors to ripen the wood. When there is no room in the greenhouse the tubs are taken direct from the cellar to their permanent summer position late enough to escape frosts.

As a whole, the method demands close attention and careful manipulation. While visiting orchard houses in Europe in 1894 and again in 1897 the thought came to me that this method could be utilized in experiments in the prairie Northwest. The applicability of this method elsewhere remains to be determined.

The use of dwarf stocks is necessary, as the Paradise for the apple, quince for the pear, and the western sand cherry for the stone fruits.

Considerable success has been secured in hastening the fruiting of cross-bred seedlings. For instance, strawberries originated one winter by crossing the wild with the tame have been raised up to fruiting size the same year outdoors and fruited in pots under glass the following winter. This saves much time in selecting varieties for propagation, and also hastens the work of propagation by our being able to pot many layers before transplanting to the field.

In handling a quarter of a million fruit seedlings I find many interesting side lines of investigation presenting themselves, but just now the main effort must be to originate a few varieties of the various orchard and small fruits worthy of a permanent place on the present limited fruit list. Some of the seedling variations which present themselves make me feel confident that Dr. Hugo De Vries in his theory of mutation hit the nail on the head. It is certainly a very helpful thought that new forms worthy of specific rank can originate as sports; that evolution is by steps instead of being a long and very gradual upward slope. Members of the legislature who have the dispensing of funds will certainly find more comfort in the theory of De Vries than in that of Darwin. My experience at first hand with many thousand seedlings of native and cultivated fruits and plants certainly compels me to believe that the evolution of new species as the result of man's effort intelligently directed is more like the labor of an inventor of machinery in his workshop than that of an observer of an ever changing panorama. In brief, plant breeding is the inventing of new plants, using material as furnished by nature, and the time necessary for the work with modern scientific methods is very much shorter than that usually considered necessary. The modern plant breeder rides in his automobile on the highway of evolution. And perhaps Mendel's law and the De Vries mutation theory are two of the wheels.

T. L. Lyon, of Nebraska, discussed Improvement in the Quality of Wheat, as follows:

My object in presenting this matter at this time is to call attention to the difficulties that present themselves in attempting to improve the quality of wheat. So far as I have been able to ascertain, efforts at improvement in the quality of wheat have not dealt with the individual plant, but with the progeny of otherwise desirable plants. In selecting plants for improvement the selection has been based primarily on the yield of grain, stiffness of straw, rust resistance, or other points of that kind. After several generations had been produced the selection was then applied to quality. The result of this has been to limit the number of plants selected for quality, and thus to curtail the possibility of improvement in that direction.

The reason that selection for improvement has not gone hand in hand with selection for yield in the individual plant is because we have not had a method

for selecting plants with reference to the quality of the wheat itself. My object, then, in starting this work was to find some method of sampling the plant that would give an indication of its quality.

In my work a number of plants of Turkish Red wheat were analyzed, each head of the plant being harvested separately, and the analysis being made separately of each head, all kernels of each head being used. The data obtained show that there is quite a difference in the proteid content of these various heads, and that it would not be safe to take the analysis of any one spike as representing the composition of the plant on which it grew.

Analyses were also made of groups of spikes on the same plant—that is, supposing that a plant bore ten spikes, we would take five of those in one group and five in the other group, then shell out all of the kernels in each group and analyze each group separately. In other words, we made an analysis of half of the kernels on half of the heads of the plant. The results attained in this way were very much closer than the results of analyzing the separate heads. Thus by taking half the number of heads of the plant and analyzing them we got a fairly good sample of the whole plant. Separate analyses made of the two rows of kernels showed small difference in the total nitrogen and proteid content of the samples.

In carrying on our work we have adopted the practice of sampling each head by taking one row of spikelets as a sample for analysis and the other row of spikelets as a sample for planting; then by sampling each head on the plant we get what we consider to be a good average sample of the plant for analysis.

The proteid nitrogen content of 800 spikes of Turkish Red wheat selected in the field in 1902 with special pains to secure heads that were thoroughly matured and free from disease was determined and the seed planted. From the crop thus obtained selections were made and kernels from entire plants were sampled and analyzed. The minimum content of proteids, that is, proteid nitrogen multiplied by 5.7, was 6.38; the maximum, 28.21; showing a very large range and indicating the possibility of increasing very largely the nitrogen content by selection. Analyses of 351 plants grown from the above in 1903 showed a minimum proteid content of 5.84 per cent and a maximum of 33.34 per cent.

When the analyses of the original 800 spikes were made determinations were also made of specific gravity of the kernels in a considerable number of the heads. The weight of the kernels on the low nitrogen content heads was found to be somewhat larger than it was on those of high nitrogen content. While the decrease was not regular, there was a slight tendency for the yield to decrease as the nitrogen content increased. The weight of the average kernel also agreed with the weight of the kernels on the spike, there being in the main a slight decrease in the weight of the average kernel as the content of proteid nitrogen increased. The number of kernels on the spike did not vary particularly. The volume occupied by the kernels decreased, or had a slight tendency to decrease, as the proteid nitrogen content increased. The specific gravity decreased regularly as the content of nitrogen increased. The proteid nitrogen in all the kernels increased as the percentage increased, and the proteid nitrogen in the average kernel increased as the percentage increased; so that, in spite of the fact that the kernels became somewhat smaller and lighter, the total production of nitrogen increased as the percentage increased. In other words, a selection based on increase in percentage of nitrogen would increase at the same time the total production of nitrogen.

Similar figures for the nitrogen content of all of the heads of the plant of the crop of 1903, instead of one head as in 1902, also showed that the number of kernels decreased slightly as the percentage of nitrogen increased; the weight of the kernels also decreased as the percentage of nitrogen increased; the weight of the average kernel seemed to vary more than it did before, but the tendency was for the weight to decrease with an increase in the percentage of proteid nitrogen; the grams of proteid nitrogen in the kernels increased in the main as the percentage increased; and the grams of proteid nitrogen in the average kernel increased as the percentage increased. The increase in the average kernel was very large.

We discarded all kernels that were not fully developed because it is well understood that kernels that had not fully ripened would have a higher nitrogen content than those that had.

In the crop of 1903 we also determined gliadin and glutenin in most of the plants. Our object in doing this was not very definite. Of course we were

attempting to estimate the constituents that go to produce gluten in the wheat, but there is so little known as to the location of these proteids in the kernel and the relation that they bear to each other and to gluten that the matter is very indefinite. But it was hoped to ascertain what variation there might be and to throw some light on the matter, if possible. The results show that while the percentage of proteid nitrogen increased from 1.89 to 5.16, the percentage of gliadin plus glutenin nitrogen increased from 1.76 to 2.20. In other words, the increase in the proteid nitrogen content was very much greater in proportion than the increase in the gliadin plus glutenin nitrogen. Therefore the percentage of proteid nitrogen is not a guide in selection for the percentage of gliadin plus glutenin, and if we are selecting for these proteids we must determine them separately. It was further found that as far as the quality of gluten may be determined by the proportion of gliadin to glutenin, that quality remains practically the same as we increase the total per cent of gluten. If the ratio of gliadin to glutenin indicates the quality of the gluten, then in selecting plants of high gluten content we are selecting plants with the same quality of gluten as if we are selecting plants of low gluten content. There would therefore be no danger of plants deteriorating in the quality of gluten if we select plants of high gluten content.

A study of the relation of the nitrogen content of the parent plant to that of the offspring of the first generation showed that the tendency was for the progeny to increase in percentage of nitrogen less rapidly than the mother plants, but in the same way, thus demonstrating that the selection has an effect. This is an important point, because if the kernels of the parent plant were immature or shriveled they would naturally show a higher nitrogen content, and yet we would not expect them to transmit their nitrogen content. If we find, however, that there is a transmission of the nitrogen content we know that it is due to a healthy condition of the plant and is a factor that can be depended upon in improving the wheat in this way.

We found the same tendency toward heredity in the weight of the average kernel that we did in the nitrogen content. In other words, plants of a low weight of kernel tend to produce plants having low kernel weight, and plants of high kernel weight tend to produce plants of higher kernel weight. The variation is not so great as it was with the nitrogen content: still it is consistent, or nearly so, and the hereditary tendency is carried out. We find that wheat varies very greatly in that respect from year to year. The plants, however, maintain their relative standing as to weight of kernel. We have found that in certain years—notably in dry years—the percentage of nitrogen is very high, while the kernels are apt to be small; but in spite of that, the production of nitrogen per acre is generally greater in dry years than in wet years. In other words, the years when we have large crops we do not get as large a production per acre of nitrogen in the grain.

There was a very decided decrease in the yield with the lateness in ripening, and a somewhat marked increase in percentage of proteid nitrogen.

As the yield of grain on the plant increased the height of the plant increased up to a certain point, and then began to decrease; so that the plants of large yield were here plants of medium height. In a similar way the plants that tillered largely were plants having a medium range of yield, and, as regards the weight of the average kernel, the plants of large yield were the plants having a kernel of somewhat more than medium or large weight. So that the best plants appeared to be the plants of average height, and the plants that tillered most were plants of average yield, although data on this point are somewhat limited and do not warrant final conclusions.

Some observations were made on the effect of winterkilling, which showed that there was a constant increase in the yield of the average plant as the number of plants that survived increased. In other words, the effect of the freezing seemed to be to weaken the other plants, or rather, the plants that did survive were injured by the cold, to which they were more susceptible than plants in the families of which a large percentage survived the winter.

H. SNYDER, of Minnesota. There are one or two points that were brought out by the figures that perhaps can be mentioned a second time without detriment, and one was that with an increase of nitrogen there was a possibility of a slight decrease in yield. Of course, in taking hold of this question it is highly desirable that yield and quality be combined as far as possible. That is one of the problems that remains yet to be solved along this line. Another question that

suggests itself is, Whenever the amount of nitrogen is increased in wheat is it possible for a part of that nitrogen to be stored up in the germ and bran and other parts, rather than in the portion used for flour-making purposes? While in general the increase in the percentage of nitrogen in wheat was followed by an increase of the total gluten, or gliadin and glutenin combined, yet cases are cited in which the total nitrogen was much in excess of gliadin and glutenin, suggesting that in the offal parts a part of this excess of nitrogen was present. So that in taking up the question the object would be to get the nitrogen in the portion that is used for human food rather than in the germ and the offal.

Another point brought out was the necessity of having methods for determining the value, not only of wheat, but cereals in general, where improvement is contemplated. Of course we have individual ideas, but the ideas, perhaps, that would be applicable to one wheat or one cereal would be more a local standard rather than applicable to all conditions; and with that in view I think it would be highly desirable at this time if the association could offer some help. I would therefore move that a committee of three be appointed by the chair to constitute a committee on standards for determining the value of the cereals; the committee not to complete its work in one year, but to be more of a standing committee, so as to have plenty of opportunity and time to take up this work, which would involve a study of the actual value of cereals for human food purposes, their value to the miller for flour-making purposes, their value to the baker for bread-making purposes, and their value to the farmer for cultural purposes. To illustrate further, some of these wheats that have a very high nitrogen content might be the very lightest weight wheats, and if you were to select on nitrogen alone you would get the very lightest weight wheat in the market.

Then, too, the question of flour yield should be considered. In some wheats as high as 76 per cent of the total weight of the wheat is recovered as marketable flour; in others the yield is as low as 46 per cent. It is desirable to get as high a yield of flour as possible and flour of the best quality, and that is the object of this committee—to take this up in a broad way, so that we will have some standards for comparison in this work.

It has been found necessary to combine milling tests with analysis. In our own station we have recently added a complete experimental milling plant with four reduction rollers, so that we can get the yields of all of the different grades of flour and all of the offals. That is quite helpful, as the work, in order to meet with the greatest measure of success possible, requires not only the careful kind of work which Mr. Lyon has done, but must go a step further, getting the flour value, the baking value, and, if necessary, the food value, as well as determining the yield per acre and nitrogen content.

C. E. THORNE, of Ohio. We have been testing a number of varieties of wheat at the Ohio Station. One of these has given us a very high yield, and it has begun to go upon the market. We are hearing from the millers very strong objections to that particular variety of wheat, saying that it is not a good flour-making wheat. The millers are quoting the verdict of a private laboratory which sustains this opinion. This year we sent to that private laboratory some thirty-odd unnamed varieties of wheat, this one among the rest. Notwithstanding the fact that this laboratory had previously given a verdict entirely unfavorable to this particular variety, in the report which came back to us this particular variety ranked second—next to the highest—in milling quality of the many varieties of wheat. Therefore we feel the necessity very urgently and strongly for a test laboratory of the kind mentioned, which shall be of uncontested reputation as an authority, to which we may go for the determination of questions of this sort.

We have been making analyses of wheat for a number of years, and have just

lately put together the results. We found for a number of years in succession a steady increase in the amount of nitrogen in the average of the whole until we came to the year 1903, when there was a sudden drop to a point below the lowest of the previous years' record. If we had been making experiments to increase the nitrogen in our wheats we would have felt for a half dozen years that we were securing important results, all to be thrown to the wind in that one year.

C. G. HOPKINS, of Illinois. I want to call attention to the fact that Professor Lyon is breeding in two directions, and in that he is independent of seasonal influence. In other words, he is breeding for both high and low protein; so that in a year that produces high-protein wheat both levels are raised, but the difference keeps increasing. We have had the same experience with corn. In our high-protein cornfield, for example, we do not find that the increase is constant; it may rise for three years and then fall and then rise again. Similar fluctuations are also observed with the low-protein corn, but the difference between the two is more constant.

It is of importance in breeding for high protein to maintain a supply of nitrogen in the soil. The supply of nitrogen is just as important in breeding wheat or corn as in breeding animals. The question frequently arises whether growing high-protein corn or wheat does not more rapidly reduce the fertility of the soil. Nitrogen is a peculiar element; it is made available for food as it passes into nitrate form. With this process of nitrification the corn plant or wheat plant has nothing to do. Once in the form of nitrates, so far as we know, the nitrogen is either taken up by crops or it is lost; and the point brought out by Professor Lyon that in the wet seasons the nitrogen content was low may be attributed to the fact that his nitrogen passed off in drainage waters, and was lost to the crop. It would seem, therefore, that the growing of high-protein wheat or high-protein corn is more likely to result in a saving of nitrogen than in any extra draft upon the nitrogen content of the soil. If it is not taken up by the crops it is almost sure to pass off before the next crop is grown.

In reply to a question as to the possibility of judging of the quality of wheat by means of a physical examination, Professor Lyon said: "I suppose that the quality of the wheat is indicated to a considerable extent, at least, by the appearance of the kernel—that is, by its hardness and by the color." Professor Snyder brought out in one of his recent bulletins the difference between the appearance of glutenous wheat and starchy wheat, as shown by the cross-section of a kernel, and I have no doubt that that could be used to a considerable extent as a guide to the quality of wheat in planting.

W. M. HAYS, of Minnesota. I am very much struck with the wide variation reported. It is much more than I would expect with the method followed, but dealing with the product of a single mother plant for several generations I would expect to get very much greater variation.

M. A. SCOVELL, of Kentucky. I am afraid that in the next fifty years scientists will not accept our analyses for proteid compounds any more readily than we accept the analyses of fifty years ago. If we could find out the relation between nitrogen and gluten content, baking qualities, etc., of wheat, the total nitrogen would be the most satisfactory basis of judgment, because it is so easily and accurately determined.

W. SAUNDERS, of Canada. What surprises me very much in this paper is the fact that the composition of the grain from different sides of the same head varies so widely. It shows how very careful we have to be in drawing any conclusions with reference to this subject. Certainly this paper throws a light on the subject that we have never had before.

The motion to appoint a committee on this subject was carried.

The committee, announced later, consists of H. Snyder, of Minnesota; C. G. Hopkins, of Illinois, and T. L. Lyon, of Nebraska.

ANIMAL BREEDING.

C. F. Curtiss, of Iowa, read the following paper on this subject:

"An exact determination of the laws of heredity will probably work more change in man's outlook on the world and his power over nature than any other advance in natural knowledge that can be clearly foreseen."

These are the words of a distinguished scientist who believes that these laws can and will be determined by careful investigation and the tabulation of statistical results indicating the course of heredity under different conditions. That there has been a great awakening of interest in the principles of breeding plants and animals and in biological problems is plainly apparent. This search for the truth concerning the laws of life is tersely put by Pearson in the following paragraph:

"There is an insatiable desire in the human breast to resume in some short formula, some brief statement, the facts of human experience. It leads the savage to 'account' for all natural phenomena by deifying the wind, and the stream, and the tree. It leads civilized man, on the other hand, to express his emotional experience in works of art, and his physical and mental experience in the formulae or so-called laws of science."

The recent investigations in this field have related chiefly to plant breeding. The plant breeders have given us the first mathematical formulas for measuring the forces of heredity. While it is not certain that these formulas are of general application and many investigators are not willing to accept them at all, they have attracted wide attention and stimulated inquiry.

This activity on the part of plant breeders has invaded the field of animal breeders. Some valuable work has been done in recent years, and the future gives promise of the inauguration of extensive investigations that will undoubtedly throw much light on our knowledge of the laws of animal breeding.

The creative and deductive work of such men as Burbank, Ewart, De Vries, Vilmorin, Galton, and Mendel have been a great incentive to scientific and practical investigation.

The lack of means, equipment, and time required for study and inquiry in this field has thus far prevented the experiment stations in the various States from undertaking much of this work. Many of the stations are now preparing to establish work in animal breeding, however, and some few already have work in progress. The American Breeders' Association was organized in St. Louis in December, 1903, and now has about 20 life members and 300 annual members, some of whom are enrolled from foreign countries. It is the purpose of this organization to afford opportunity for discussion and comparison of methods, principles, and results from the work of the leading authorities on plant and animal breeding of all countries.

The last Congress made an appropriation of \$25,000 for cooperative breeding and feeding work under the direction of the Secretary of Agriculture, and cooperative work has already been inaugurated by the Bureau of Animal Industry in several of the stations, the most notable being that in Colorado for the purpose of producing a heavy harness or coach horse type by the use of the American trotting horse as foundation stock. The excellence of some of the best specimens of trotting-bred horses for this purpose and the importance of and demand for superior horses of this type renders this a work of great interest and far-reaching consequences.

I have recently addressed inquiries to about twenty of the experiment stations giving most attention to animal husbandry, asking the nature of the animal breeding work they have in progress or plans under contemplation for inauguration of this work in the future. From the stations having work in progress I have the following replies:

By Prof. E. R. Lloyd, of Mississippi: "We have done no really scientific work in animal breeding, but our efforts have been directed mainly along the line of improving the native 'scrub' cattle of the State, as regards their beef form and feeding qualities. I will briefly outline what we have attempted and give some of the results accomplished.

"Our foundation herd was composed of 25 native cows of no fixed type or breeding, with perhaps Jersey blood predominating. An Angus bull of good beef form was used on this herd. We now have 50 animals in the herd, ranging from

one-half to seven-eighths Angus blood. A rigid selection has been made each year, retaining in the herd only those animals that approach nearest the type we want. From the half-blood calves 98 per cent are hornless and 95 per cent solid black. The foundation herd of native cows were all colors, and all except four had horns. The form and feeding quality of the calves has been much improved and their market value increased. Our grade Angus calves will sell readily for one-third more than the native calves of same age. Our calves are larger at same age and many of them look like pure-bred Angus. Our grade steers of 2 and 3 years old will bring from one-half to 1 per cent more per pound on foot than native steers or same age and size. We are this year establishing some work with Shorthorn bulls on native cows.

"We have not as yet gone far enough into the feeding or finishing of these grade steers to be able to make a report of that side of the work. We have in progress comparative feeding of native and grade steers, and this work will continue for some time yet. We have graded up a bunch of sheep by using Dorset bucks on native ewes. The native ewes give an average clip of 2.9 pounds of wool, and only about 5 per cent dropped twin lambs. Our flock now averages 5 pounds of wool, and 50 per cent brought twin lambs last season.

"I hope you may be able to form some idea of our work from this brief statement. Our farmers are taking great interest in better cattle, especially beef cattle. Our station inoculated over 300 registered cattle for farmers last season."

By Prof. J. H. Skinner, of Indiana: "At present we are conducting some experiments in swine breeding. As you are aware, there has been much discussion as to the use of bacon hogs, especially to bring in renewed vitality and increase of prolificacy of other breeds. We have undertaken to investigate the matter of crossing Poland Chinas on Yorkshires, selecting the females which have a tendency toward bacon type from each generation and using pure-bred Poland China males to mate with these sows. The work has been in progress two years. We are not in position, however, to make any statements in regard to results, as I believe such experiments should be carefully worked out and sufficient data secured before drawing any conclusions."

By Prof. R. S. Shaw, of Michigan: "At present we have the necessary facilities about complete for launching out on an extensive line of breeding in which the grade dairy cow is to be the subject used. One of our men is at present in the field purchasing 20 high-grade Shorthorn cows. These are to be brought to the institution and a record made regarding the age, weight, form, quality, etc., of each individual, each record to be accompanied by a photograph. The cows will then be divided into 4 uniform lots. The females of lot 1 and their female offspring will be bred to a continuous line of Holstein bulls; lot 2 to Jersey bulls; lot 3 to Guernsey bulls, and lot 4 to dual purpose Shorthorn bulls. The idea is to keep a record of each generation of females as dairy producers and to determine the veal or baby beef values of the male offspring. The primary object of this work will be to demonstrate the possibilities of improving common-grade stock through upgrading. The secondary object will be to demonstrate what good feeding, care, and management will do to increase the productiveness of the original stocks chosen. The indiscriminate admixtures of blood in breeding dairy cows has led to this line of work.

"One year ago we started some investigations in breeding in relation to size in dairy cows. For example, in purchasing Ayrshire cows we found it almost impossible to secure cows possessed of the size which the breed manifested ten to fifteen years ago. Two Ayrshire cows were purchased which at thirty-seven months of age had produced two calves each; neither cow weighing to exceed 700 pounds. A lifetime record of these two cows, in addition to several of other breeds, is to be kept. It is the intention to so breed and handle the female offspring as to produce larger individuals conforming more nearly to the original type, and then secure, as far as possible, comparative data relative to the two types.

"We have no definite plans as yet relative to breeding problems among beef cattle. Our swine department is being adjusted as rapidly as possible so as to enable us to begin original investigation work in swine breeding. Up to the present we have simply produced several crosses in order to study more carefully those types occupying a place midway between extreme lard and bacon types. During the past two years sheep and swine feeding investigations have been conducted here quite extensively."

By Prof. C. S. Plumb, of Ohio: "It seems to me some experiments might be conducted systematically, dealing with telegony, cross breeding, in-and-in

breeding, fecundity, and some other subjects in which little has yet been attempted. This work will necessarily cover considerable time and may involve various kinds of animals, but it is clear in my mind that it should be done. There are two good reasons for this work: One, to secure definite knowledge on some things involving the principles of breeding; the other to furnish scientific aid to farm practice, such as relates to methods of breeding, and in its application to such things as fecundity, prepotency, etc.

"The cooperative feature of breeding work can be made very useful, but it will have to be worked into, it seems to me, gradually, with the station also checking up, if possible, in the same line of investigation."

By Prof. James W. Wilson, of South Dakota: "I am starting a new breed of hogs. I think there is a demand in this State for a lard breed more prolific and with greater fecundity than the Duroc Jerseys or Poland Chinas. We are carrying on an experiment with sheep. It is our intention to include the six leading breeds of sheep and ewes of common range breeding. We will breed ten head of each each year to each of these rams, rotating the rams each year and using the same ewes, fattening the lambs off at 1 year old, which experiment will give us some idea of the best breed of sheep to use for our conditions. A similar experiment with cattle is now under way."

By Prof. Andrew Boss, of Minnesota: "The line of work that I have most completely in mind is that of founding breeds that have the intrinsic qualities demanded by the market. In view of this I have been selecting certain families of hogs that conform to the market demands and recording their breeding, and in most cases working out the good qualities of the litters when fatted. This, however, has given us only the most meager kind of a foundation for good work in the future. As soon as we learn the value and characteristics of the foundation stock on hand it will be our object to fasten, if possible, the characteristics of the breed either by cross breeding, inbreeding, or whatever other method we may find satisfactory.

"I believe that in order to get good results we must know just exactly what the individuals are worth that we are working with, and that we must have definite knowledge as to the best means of propagating their usefulness.

"My ideas in regard to the problems in animal breeding are not so extensive, possibly, as some other people may have. As I see it the problems must be solved by large moneyed interests. Results come so slowly in animal breeding that one individual is not able to accomplish very much in the way of permanent results. I believe the colleges and stations could do a great work in this line if they were organized into a cooperative association, and select for director of the work some man or a committee of men who are well up in the subject, and who would give promise of long service. The institutions could also work with the individual breeders, but it is so hard to control conditions there, or rather to control the inclinations of the individual breeders, that I believe better results would be obtained under experiment station management.

"I have no outline to submit of any plan of work with the colleges and experiment stations. My individual plan for animal breeding in experiments is not on a basis that would be of value to such an organization. They include simply the measuring of individuals for foundation work and of further testing the value of these animals by measuring the value of the offspring. When these facts have been learned, then comes a plan for fixing the qualities, or possibly developing a new breed."

By Prof. F. B. Mumford, of Missouri: "In my opinion the greatest need in animal breeding at the present time is for experimental data secured by painstaking, accurate research, which will help us to decide with much more definiteness upon some of the questions which are now largely matters of opinion. This opinion, I think, is held by the leading biologists of this and other countries.

"The investigations in this subject by the stations should, it seems to me, contribute to the upbuilding of the science of breeding. Following this suggestion to its logical conclusion means long and laborious experimentation, using large numbers of animals. The expense of this work with farm animals, and the small number of individuals, makes it difficult or impossible to carry on this work with such animals. It will be necessary to investigate many of these questions by the use of small animals that breed rapidly.

"Another line of experiments which are of the greatest practical value to breeders is an investigation of the influence of environment, including exercise, feed, shelter, etc., on the breeding efficiency of animals. There are great possi-

bilities in this latter work. This does not by any means exhaust the possibilities of research in animal breeding."

By Prof. W. R. Dodson, of Louisiana: "As you know, we have been working for several years on the immunization of northern cattle to the Texas fever. We now have on hand a small herd, consisting of nine mothers, grade Angus, purchased nearly three years ago in Clinton, Ill., immunized at Baton Rouge, and bred to a registered Angus bull purchased at the same place at the same time. All of these heifers have calves that have passed through the summer, and all have been heavily infested with ticks. Two of the cows have a second calf, and all of them will have their second calf this winter. We have ten head of grade Hereford calves, raised on the station. The oldest one of these will have a calf about February; several others will come in about May. These animals will compare favorably with any to be found on the farms of Illinois, Missouri, or elsewhere outside of the barns of the fancy breeder. Of course, you are aware that our native cattle all have the fever when they are calves, as has been brought out by our work, and while the disease to a considerable extent retards the development of the animal, as soon as the ticks are removed the animal soon begins to recover from the effects; and if the ticks are not allowed to become excessively abundant the animal thrives apparently as well as in the North. Our calves running on the pasture are as fat from the latter part of April to the latter part of October as they are in the blue-grass section. We have also demonstrated that it is possible to rid our pastures of ticks. This, of course, puts a different future before the stockman of the South. Though it will be more trouble, and require greater vigilance, I see no reason why the intelligent and industrious farmer of the South should not equal or excel the northern man in the production of beef and milch cattle.

"We are not doing anything with other lines of animal breeding. I might remind you of the fact that we topped the market at Chicago with some beef steers purchased as calves in Illinois, immunized in Louisiana, fattened after having been there two years, and reshipped to Chicago."

By Prof. E. W. Major, of California: "The live-stock work here has been started such a short time that we have not had opportunity to carry on any breeding experiments so far. At present I am purchasing some hogs. Shall have some Berkshires, Poland Chinas, and Tamworths, and shall try some experiments with these. I am rather looking to see if we can not find a hog that will do better in the alfalfa sections than the Poland Chinas. These experiments will be largely along the line of feeding, but I expect to do some at the present time in cross breeding. We intend to do some experimenting right away in poultry breeding.

"In regard to suggestions, the one that appeals to me most forcibly is this: If experiment station workers would start a discussion, it would have to be done by correspondence, in regard to the data to be recorded in breeding experiments. Those of us who are situated so far from the center, and therefore are unable to attend many meetings, have little opportunity of discussing the question with other experiment station men and getting in touch with the work they are doing."

Aside from this, the work largely done at several of the stations is familiar to the members of this body. The work of the Wisconsin Experiment Station in crossing and grading unimproved types of sheep has given striking results that have been of practical and scientific value. The provisions for the investigations of Professor Davenport at the newly equipped laboratory under the auspices of the Carnegie Institute is significant of the growing interest in this field of inquiry, and the results of these investigations will be looked forward to with unusual interest.

At the Iowa station several lines of animal-breeding work are in progress. It is well known that we have no breed of sheep in America adapted to the range conditions and meeting the requirements of the range in any adequate manner. Sheep raisers in the range territory resort to frequent crossing, alternating from the Merino to the coarse-wooled mutton breeds for compactness of fleece, ability to graze in large numbers, size, length of staple, and then to the Down breeds for improvement of mutton qualities. It is necessary to make frequent changes in the use of these types, and there is a lack of uniformity and stability in breed characteristics and qualities desired for range conditions.

We have taken up work in crossing these types with a view to gradually evolving something that will meet the requirements of range conditions and

that may be fixed and perpetuated. This work has been in progress during the past three years, but has not yet advanced far enough to reach definite results.

In 1900 the Union Stockyard and Transit Company of Chicago furnished funds for the inauguration of some breeding and feeding experiments known as the production of "Blue-Gray" cattle, by the use of white Shorthorn sire on grade and pure bred Galloway females. We have already produced two crops of calves and the third is due this fall. The first crop is now coming two years old, and they are being finished for market and for the International Live Stock Exposition at Chicago, and some interesting and rather striking results have been attained. The superior reputation of these cattle as feeding bullocks has been fully confirmed. They are not, however, quite as even in their flesh and as smooth and uniform in their carcass in all cases as the modern market demands. We hope to introduce some new features in this work during the coming year by selecting ten of the best Galloway cows, which have during the past two seasons been bred to a white Shorthorn bull, to be bred during the coming year to a pure-bred Galloway, thus giving opportunity to test the theory of "telegony." It is also proposed to select ten white Shorthorn females and breed to a pure-bred Galloway bull, thus reversing the process of producing Blue-Grays. Then, before we terminate the experiment, we shall do some breeding with a view to fixing the Blue-Gray characteristics and endeavor to perpetuate type. We are well aware that this may be a difficult process, but it is the intention to conduct some investigations along this line.

During the progress of this work an interesting and unexpected result was obtained in the fact that the second crop of calves from the same cows and by the same sire were not as uniform and as well colored as the first lot. There is no means of accounting for this departure from the Blue-Gray color in the greater number of instances in the second than in the first mating. It is believed by many of our best breeders that subsequent offspring by the same sire and from the same females will be more uniform in type and color and characteristics than the first offspring.

We have also planned to cross two breeds of hogs, using, perhaps, the Berkshire and Tamworth, with the sire of one breed in a given number of cases and the sire of the other breed in an equal number of cases. Perhaps five or ten sires of each breed will be used and the work repeated several times. One object of this will be to determine the relative influence of the sire and dam in crossing distinct types. Some of these sows will then be bred back to sires of the same breed, to test the theory of telegony in breeding hogs.

In some work of this kind which has already been carried on during two seasons it has seemed in crossing the Tamworth and Poland China that the dam exerted the greater influence. When the Poland China sire was used on the Tamworth dam the offspring had more of the Tamworth than when the Tamworth sire was used on the Poland China dam.

I believe that many of the theories and supposed laws of heredity should be tested by extensive and repeated experiments with domestic animals, and that it is desirable that this work be done with the larger rather than the smaller animals, notwithstanding the fact that it will take a much longer time and involve a greater expenditure. The work of Prof. Cossar Ewart in crossing the horse and zebra, breeding back again to the original types, for the purpose of testing the theory of telegony, has perhaps done more to establish conclusive results concerning this one theory than all the previous investigations combined. Professor Ewart's conclusions, however, are applied only to horses and dogs, and he expresses no opinion concerning their application to other kinds of domestic animals. Some of our plant breeders have obtained results which tend quite conclusively to substantiate the Mendel law theory. Others have obtained results quite the contrary. No one has yet endeavored to test the application of this law to the breeding of the higher domestic animals. I am told that one of our most extensive and successful dealers in heavy harness horses of trotting blood has made the statement that his experience, extending over a number of years and applying to many thousands of horses, selected with the utmost care from perhaps hundreds of thousands that have been inspected, has shown conclusively that 95 per cent of the horses conforming to this type in conformation, action, quality, and other characteristics that go to make up the essential standard, may be traced directly to two sires. This man speaks with considerable authority, as he has for years made it a practice to keep a complete record, including the breeding, of each horse that has passed through his stables. Possibly if these results were carefully investigated they might establish a case of Mendelian dominance.

The brief reports which are here submitted relative to the work now in progress in the several stations and the plans under consideration for the extension of this work, indicate clearly that this field of investigation, which has until recently been almost entirely neglected by the experiment stations, through various causes for which they have not been responsible, is soon to become one of the most interesting and profitable lines of investigation.

H. E. SUMMERS, of Iowa. I may say that certain animals, including the covies, for instance, which have been investigated quite extensively, have been found in certain characteristics, viz, color, condition of albinism, and length of hair, to conform absolutely to Mendel's law. I have myself a litter of four white covies only two days old, from a white and colored mother, in which the probabilities under any other conditions than the Mendelian law would be almost too great to be conceived of. This is simply one illustration, and of course would not prove the law, but it agrees with some thousands of experiments which have shown that the law applies.

W. M. HAYS, of Minnesota. Whether these conflicting reports are really conflicting or based on experiments that really give the true comparison as to the operation of the Mendelian law, I can cite the following case: An experimenter in England, I understand, worked on the color of some animals and found that it did not follow the Mendelian law, but he afterwards found that there were three component colors in that compound color, and when taken separately they did follow the Mendelian law, and that these were the unit characters while the component color was a variable character. Practically a parallel case was found in the orchid grown by some English experimenter, in which the component colors operated in accordance with the Mendelian idea, whereas the blended color had not so operated. Experiments must first be made along the line of finding whether the characteristic in question is a dominant or unit character.

N. S. MAYO, of Cuba, spoke briefly of that country as a field for the breeding and adaptation of animals.

W. M. HAYS. In the recent breeding school at St. Louis Doctor Cary, of Alabama, brought out the fact that he thought it might be possible to breed immunity to Texas fever in the southern belt, and that then quarantine methods might be used to gradually push the tick out of that country. Experiments have also been suggested along the line of breeding for at least comparative immunity from tuberculosis in cattle, thus lessening tuberculosis in man to some extent; also the possibility of breeding for comparative immunity to swine plague in hogs. Some of the smaller animals can be used, no doubt, to illustrate whether immunity can be reached by this method; for instance, rabbits are very subject to tuberculosis and they might be used in a preliminary experiment. Experiments are now being successfully made in the breeding of plants immune to disease. Professor Bolley has recently produced very pronounced results on flax. At the school in St. Louis Professor Bolley brought out with very great force the idea that if you want to breed for immunity the disease must be present in great quantity. Of course that is true of all breeding. We must breed as nearly as we can under the extreme conditions we wish the final product to withstand.

The committee on nominations reported as follows:

For members of executive committee, W. H. Jordan, of New York; C. F. Curtiss, of Iowa; for chairman of section, H. J. Patterson, of Maryland; for secretary of section, M. A. Scovell, of Kentucky; for additional members of committee on programme, C. D. Woods, of Maine, J. F. Dugger, of Alabama.

The secretary was instructed to cast the ballot of the section in favor of the persons so nominated.

EVENING SESSION, WEDNESDAY, NOVEMBER 2, 1904.

The section was called to order at 9.30 p. m. by Chairman Jenkins, who announced the subject for discussion to be:

HOW MUCH TEACHING, IF ANY, IS IT DESIRABLE THAT A STATION WORKER SHOULD DO?

H. P. ARMSBY, of Pennsylvania. We are all familiar with the history of the establishment of the experiment stations and with the very natural way in which they were manned from the teaching force of the colleges, the time of the instructor being divided between the college and the station. This method of procedure was very natural and perhaps unavoidable at that time, and the practice has continued up to the present. During the last year for which statistics have been published by the Office of Experiment Stations about 54 per cent of the station workers did more or less teaching. Of course such figures are somewhat misleading since they give simply the number of individuals without reference to the amount of work done, but they at least show that a very considerable proportion of the workers in the stations are also teachers. The proportion of course varies a good deal in the different stations. In some stations—one or two—all members of the force are stated to have more or less teaching work, and the proportion ranges from 100 per cent in these cases down to a minimum of about $5\frac{1}{2}$ per cent. The second largest is 89 per cent, and the second smallest about $15\frac{1}{2}$ per cent.

Moreover, the tendency seems to be toward an increase in the number of the station men who are also doing teaching work. In the year ended June 30, 1897—the earliest for which I could readily find figures—the percentage of station workers who were also teachers, excluding in this computation the independent stations of Connecticut, New York, Georgia, and Ohio, was 49.3, and for succeeding years up to 1903 the figures run in round numbers 49, 50, 50, 52, 52, 56, and 54, showing quite a plain tendency toward an increase in the proportion of station workers who teach.

Most of you will probably recall the address of Director Jordan at the New Haven convention, in which he called attention to the fact that in that year a very large proportion of the heads of departments in stations were also teachers, so that the teaching work was laid upon the higher officers of the stations rather than upon the lower grade assistants. I think that would probably be equally true—perhaps more true—now. The fact of the matter is that the recent growth of instruction in agriculture—the differentiation of agricultural instruction—has had a tendency to increase the demands upon the station specialist for teaching.

I think we all agree that it is an important question of station administration as to how far this tendency is wise and desirable. Some, for whose opinion upon such matters I have the very highest respect, urge very strongly that it is desirable, in most cases, at least, that the experiment station worker shall also be a teacher, and the teacher shall also be an investigator. They claim that the two kinds of work are mutually helpful to each other. I am not clear that I agree with that opinion, however. But this is too important a question for our opinions or convictions to be settled subjectively by our own personal impressions, and the thought that was really in my mind in suggesting this topic for discussion was whether we could not profitably get together and compare our views upon it. Of course the figures which I have presented are merely suggestive; they probably do not represent quantitatively the situation, because, doubtless,

many of the men included in the estimate had comparatively little teaching, but they do serve to suggest the importance of the question and the need for comparing views upon it.

W. H. JORDAN, of New York. If I could have the heads of the departments of the New York State Station give a few lectures (from ten to twenty) a year I would be glad to have them do it as a means of clarifying their views, looking up literature, and that sort of thing. It makes a difference what kind of teaching a station worker does as to whether it is an advantage to him or not. The most of the teaching done by college and station men in this country is the teaching of fundamentals, and I believe it is nothing but a pleasant fallacy on the part of those who wish to reenforce their teaching staff to maintain that teaching the fundamentals and the drilling of classes for 50 per cent of the time is an advantage to the investigator. I do not believe any such thing. I believe in the differentiation of functions. What kind of a man do you want for an investigator? A man absorbed in the things he is doing and who shall not be turned aside and wearied by having to drill a class or do anything else but hunt his subject and the truth. You know that teaching has to be done at stated times, and the investigation must wait till the convenient day. That is exactly what happens in actual practice. My answer to the question would therefore be: A small amount of teaching of an advanced character along the line of the specialties with which the station man is engaged and on which he is thinking is all right. However, very much of teaching which we necessarily do in our agricultural colleges to-day is not an advantage, but a disadvantage to the investigator.

C. D. SMITH, of Michigan. I do not object so much to a subordinate doing the teaching as I do the head of the department, for the reason that if the head of a department of the station has also the management of a large teaching department of the college he can no longer do very good station work. The danger is, as experience has shown, that the demands of the teaching will gradually encroach upon and crowd out the research work. The investigator should be almost, if not quite, entirely free from the teaching work. My experience has led me to believe most emphatically that we are not going to get the results that we should get from the stations until this is done. The differentiation between the teaching and investigation must be complete.

C. D. WOODS, of Maine. I think it is easy for us to see the way we have come into the present position. When the stations were first established comparatively few skilled men were obtainable. The stations started out on the plan of the college, with a great many departments in charge of young men who had their reputations to make. The result has been that we very materially increased the station pay roll until it reached a point where it was impossible for the station alone to keep all the men required and give them the amount of money they ought to have or could get elsewhere. So it has come about that this division of men between the station and the college has perhaps increased in the later years. With a small increase of appropriation for the station it would be possible to solve this problem, and in the effort to do this I think we will have the help of the college men.

I thoroughly believe that a station man ought not to be a dual man. I wish that in our own experiment station we did not have a single man connected with the station who had routine instruction to do. Advanced instruction a few hours in the course of the year, requiring the preparation of ten, twelve, or twenty lectures for the students, would, in my opinion, be helpful, but any drudgery of teaching for a station officer I am very sure is a detriment to the station work.

C. F. CURTISS, of Iowa. I believe that the stations in many instances, and

even, I will say, a majority of instances, are approaching a better basis of adjustment of the work between the college and the station. I do not think that we can readily or in the near future attain a position where we can entirely divorce the college and station work in the heads of departments. I believe that the head of the department ought to direct the investigation work along his line at least in an advisory way, even though he does not devote any of his time to the details of that work or to the management of it. I think if he is a teacher and giving his time to the college side of the work he ought to give enough of his time to the station work to direct its course.

I am entirely convinced of the desirability of investigators doing investigating work alone or exclusively, so largely as it may be possible, and I think that the tendency generally is toward a better adjustment. In our own station, for instance, we have now established the work of two departments on such a basis that the men in charge of the station work give no instruction except to graduate students. These men will devote their time exclusively to the research and experiment station work, except in case of graduate students that may elect to take work in that department. In other departments we have an arrangement by which the head of the department is considered and regarded as primarily a college man, and receives the greater part—practically all—of his salary from the college, and has assistants who receive their salary altogether from the station, devoting their time altogether to station work. I think, as was suggested by Director Woods, that when the stations have more means to devote to this work they will be able to employ men exclusively for research work, and those men will of course be under the direction of the head of the department. So that gradually, as we enlarge our work and as we are able to provide better facilities for it, we are arriving at a better basis, although there is still very much to be done in the adjustment of work.

N. S. MAYO. It seems to me that this subject has been treated so far entirely from the standpoint of the station investigator pure and simple. There is a phase of the work that I have found of an advantage in dealing with the more elementary students in classes, and that is the training which it gives to the worker in bringing his scientific work to the level of the common man, and I believe this is an important training. A good portion of our work is for the common farmer, and it is important that we should bring it to his level, and I believe that in bringing our work to the elementary classes we do get a valuable training along that line. The greatest obstacle that I have found in teaching is the amount of energy which it necessarily requires. Two or three hours of teaching as it ought to be done detracts very materially from the energy a man can put into his investigation work.

L. G. CARPENTER, of Colorado. I suppose we can all imagine the ideal condition, but I presume none of us has yet attained it. We nearly all suffer from limitations, both from place and finances. I am not at all sure, however, that the stations as a whole have suffered by the connection with the colleges. If we look at the work of an individual we may see in a great many cases that he could do more and perhaps better work if he were disassociated from teaching. On the other hand, we have an aggregate to consider in some cases. I know that in some of the stations, as in the one with which I am connected, the aid from the colleges has been material and liberal, and has made possible the maintenance of a large number of departments that are giving more or less attention to investigation. There are undoubtedly some disadvantages in connection with the teaching. One of the greatest is, I think, the fact that the investigation has to give way to routine hours; investigation does not come at regular times. A person can not do the highest kind of work for many hours a day. To do productive and creative work, which is the best part of his work as an

investigator, a person must devote himself to it for only a short time and when he is in the freshest condition. Almost any kind of routine work does interfere with that, and to some extent teaching will so interfere, certainly if carried on to any great extent. It interferes with the continuity of thought, and the hours of teaching may interfere even with the whole day's work by the breaking up of the lines of thought or the continuity of investigation. Outside of that I am not at all sure that the teaching does not have a good many advantages.

I am inclined to believe that the investigator should do less teaching, but that the teaching should be under the direction of the investigation staff rather than the reverse. I am at present far from believing that it is wise to separate college and station, if it were possible. I do not believe that a staff worker ought to do much teaching, but as to whether the teaching he does should be that given to the higher students or to elementary students I am not quite clear, although I recognize the force of what has been said about the advantages of the instruction of the higher classes. The station workers should have a training which will enable them to express the results of their investigations in a clear way to the public. I am fully aware that there are a great many exceedingly valuable investigators who do not have that faculty and do not care to go before the public in any capacity. We recognize their value, and a great many times it is best to recognize that peculiarity of their make-up and allow them to confine themselves to investigation. On the other hand, there are a great many men who can do both, and probably the majority have to some extent the willingness and the ability to do both. To those people who do not have that particular trend, the dealing with elementary students or the attempt to put the subject in an elementary way, it seems to me, is a very valuable training, but ought to be done with limitations.

F. B. MUMFORD, of Missouri. It seems to me it has been clearly demonstrated by several of the speakers that it depends a good deal on the viewpoint from which we consider this question. The University of Missouri may be differently situated from some of the colleges and stations referred to, but so far as we are concerned we find it to the advantage of the station from almost every standpoint that the teachers who are there engaged are not only permitted but required to devote some of their time to station work. Let me give a concrete illustration. The university has in the course of its search for men in the departments secured a man who is eminent for his research work in a given line, and that line of work happens to be closely associated with agricultural college and station work. His salary is paid entirely by the university, and he has from his own choice and by the permission of the university devoted considerable time to research for the station, the station paying the expenses of the investigation. I suppose that it would be impossible for the station ever to be able to secure the services of such a man were they compelled to pay him his entire salary, but working in this way we are able to secure the advantages of his investigation. There are a number of men of this kind in our institution who are working in the same way.

J. L. HILLS, of Vermont. In the smaller institutions, where funds are comparatively limited, the dual duty must needs be met. I think you will pardon me if I tell you how at the University of Vermont we have endeavored to meet these conditions.

In my own case I try for what we term our first half year to lay almost all the stress upon college work. I have arranged with my associates in the faculty for several of them to lay almost all their teaching stress on the second half year. From October 1 to February 1, except for the routine of work which must be done, I put my energies just so far as I can into college work. After February 1 I devote my energies to the administration of the station and to

experimental work. On the other hand, other of the instructors in our faculty beginning with the second half of the year lay particular stress on the college work, and in that way we are enabled to do, perhaps, rather more justice to the dual duties than in any other way. I do not think this method is applicable to all institutions, but it has worked fairly well with us.

W. L. CARLYLE, of Colorado. I think we are all agreed that from the standpoint of the investigator too much teaching is not advisable, but from the standpoint of the teacher some station work is certainly advisable, particularly in the more industrial parts of our agricultural work. The man who is going to do effective teaching for a period of years in animal husbandry, for example, must be an investigator. If we take the investigation work away from our teachers we are going to greatly lessen the effectiveness of the teaching. It seems to me this is not so much a matter of amount of investigation as of subjects. Certain subjects require practically all of a man's time and attention in the investigational work; others are not so exacting, and those are perhaps the ones which require a certain amount of investigational work to make the teaching the more effective. Speaking from the standpoint of one who has to investigate and teach at the same time, I think it would be a misfortune, in some of the subjects particularly, if the station work and the teaching should be divorced.

H. P. ARMSBY, of Pennsylvania. I think we all recognize the fact that we can not at once adopt any uniform arrangement in this matter. But I take it what we need especially to consider at the present time is not so much the question of practicability as the question of ideals. It is a question of the attitude of mind of the authorities of these institutions toward this question; it is a question of the ultimate ideal that they will set before themselves to attain, and if that ideal is not any higher than that already reached we shall not make much progress. Personally I believe it is just as true now as it was two thousand years ago that no man can serve two masters. I believe that in this agricultural work a man should be chiefly either one thing or the other. I will not say that he should be exclusively either a teacher or an investigator, but it seems to me that the two kinds of work call for a different attitude of mind and the use of a different set of faculties, to a certain extent, and that except in the case of unusually gifted men the same individual is not likely to have both equally developed. I feel that an investigator and station worker should have his mind focused on his work of investigation. On the other hand, it seems to me that the teacher's thought should be pedagogical largely; it should be that side of his mind that is particularly active. I will admit that a certain amount of teaching may be advantageous to station work, but an uncertain amount is not. I think that some teaching, especially more or less advanced teaching, is a good thing, as has been said repeatedly. Possibly it need not even be the most advanced teaching. I do not think, however, that a station worker, even though he does some teaching, should have loaded upon him the responsibility for the administration of the teaching work of the college, or any considerable amount of it. I think he should simply go into his class room and give his lectures or his instruction, and be done with it.

On the other hand, it seems to me that the teacher may very well do more or less investigational work, according to his taste and capacity. I would not for a moment cut him off from that, but I believe he should be thinking chiefly of his teaching and should make his work of investigation his avocation rather than his vocation.

I repeat that this is a question of ideals rather than of immediate adjustment. It is not a question of division of salaries. I think we may assume

that that question has been pretty well worked out, and that so far as the mere question of adjustment of time is concerned the attempt has been to establish equity as between the college and the station; but I believe it is also true that in this matter two and two do not always make four. I am very sure that two half men are not anywhere near equal to one whole man, and, going still further, I think that four quarter men are worth very little.

I am very much gratified at the interest which has been manifested and the spirit in which this subject has been discussed. I believe it is a live subject. I believe that it is imperative now, if this experiment-station enterprise is to reach large success, that there should be a reform; that the tendency should be in the other direction from what it now appears to be; that the sentiment and policy of these institutions should be, as rapidly as conditions will allow, to differentiate between the station and the school or college of agriculture, and to have just what the Hatch Act calls for—a department of the college devoted to research. We should work toward that just as fast as we can if we desire this experiment-station enterprise to succeed, and I believe it is especially timely to consider this now, in view of the hope that we have of an increase in the station funds. If that comes, I believe the directors all over the country should know that their colleagues will support them in an endeavor to secure a more clean-cut organization of the experiment stations as distinct departments of research.

W. J. FRASER, of Illinois. It seems to me it is of greater importance to have the subdivision of the subject more minute than it is, to decide as to whether a man is going to devote the most of his time to experiment-station or to college work. In the dairy department of the University of Illinois there are two of us that are giving all of our time to dairy cattle—one to the subject of milk and another to the subject of butter. In the animal husbandry department one man devotes all of his time to swine, and I think he has done better work the past year than if he were working either in the college or station in the whole subject of animal husbandry. It seems to me that one of the best ways out of the difficulty is to divide the subjects more minutely and have a man get nearer to the bottom of his subject, both in the station and the college. I will say, however, that the heads of departments in our institution do very little teaching, but spend most of their time in investigation work.

F. B. LINFIELD, of Montana. There has been within the past few years a very great increase in the number of men employed in the agricultural colleges and experiment stations, and I believe that there are more men who are devoting their whole time to investigation at the present time than ever before. The tendency seems to be in the right direction. Without a certain amount of help from the station it is probable that in a great many cases the college would have to cut off some of its departments; at the same time, without some help from the other side, it is probable that that station would have to cut off several of its departments. Some will say that is advisable. There are conditions, however, in which that would not be advisable, and the college and station may be mutually helpful. It is a good thing for an investigator to do a little teaching; that has been conceded. I think there is a great deal in the thought that a good teacher must be an investigator, whether he does the work under the direction of an experiment station or in some other way. How is the teacher or the investigator to do the best work in this dual capacity? The plan which I have thought about is the one suggested by Director Hills. In this division of the agricultural field, which at present is going on so rapidly, such a division of labor from one part of the year to another is a very easy possibility.

H. P. ARMSBY. I have hastily computed the relative increase in the teachers and the nonteachers on the station force, as shown by the official statistics of

the Office of Experiment Stations. From 1897 to 1903 there was an increase in the nonteachers of 9 per cent and in the teachers of 32 per cent.

H. J. WHEELER, of Rhode Island. It seems to me there is perhaps some confusion in the minds of those who have spoken as to what is strictly investigation. If a man plants some potatoes and observes their form and shape and writes up the result, he can perhaps do some teaching and do that sort of work, too; but if he has to deal with some difficult problem, which requires him to make an exhaustive search of the literature of the subject, to conduct investigations which perhaps run over five or six years, and to thoroughly digest the results, he can not do it to good advantage if during that time he is obliged to go into the class room and teach at irregular hours. There may be some so-called investigation work which can be combined with teaching without very much loss.

I know of no better practice that a man can get than by going out to a farmers' institute, and I think it is a very good thing for the station worker to get out and lecture half a dozen times a year. I believe, moreover, that it is a good thing for a man to present the advanced work that he is doing to students. I think, however, that the student derives a great deal more from it than the investigator does, because there is no man who can lead a student right up to the border between the known and unknown as the investigator can. I have never seen a man devoting more than half of his time to teaching who has done work which was fully satisfactory to the experiment station. There may be extreme instances in which a man has been able to do it.

I have repeatedly heard it said that the German investigators, who are the greatest in the world, do a large amount of teaching, but the German professors who have won the greatest distinction are not teachers, but investigators who have done very little teaching. So, if there is anything in example and precedent to be won from the best scientific minds in the world, it is along that line. It is not the man who spends three-fourths of his time, or six or seven hours a week right along, in teaching who can be expected to win a reputation as an investigator.

H. P. ARMSBY. The German professor, moreover, does not have to teach unless he wishes to.

Upon motion the section adjourned.

INDEX OF NAMES.

- Agee, A., 9.
 Allen, E. W., 10, 76.
 Andrews, E. B., 9.
 Armsby, H. P., 8, 9, 19, 29, 43, 65, 118, 130,
 134, 135, 136.
 Atherton, G. W., 8, 32.
 Aulmann, R. C., 9.
 Ayres, B., 10.
 Babcock, K. C., 9, 88.
 Bailey, L. H., 7, 9, 63, 66, 69, 85, 86, 98,
 105, 106, 112, 114, 115.
 Baker, H. P., 9.
 Beach, C. L., 9.
 Bishop, E. A., 10.
 Bissell, G. W., 9.
 Bowska, F. W., 9.
 Brown, E., 8, 31.
 Bryan, E. A., 8, 10, 20, 62, 66, 87, 96.
 Buchanan, R. E., 9.
 Buckham, M. H., 8, 91.
 Buffum, B. C., 10, 117.
 Burkett, C. W., 9.
 Burnett, E. A., 9, 98.
 Butterfield, K. L., 7, 10, 56, 64, 66, 106.
 Card, F. W., 8, 10, 31.
 Carlyle, W. L., 9, 134.
 Carpenter, L. G., 8, 9, 132.
 Carstensen, A. N., 9.
 Chalmers, J., 10, 15.
 Chambliss, C. E., 10.
 Christie, G. L., 9.
 Clark, J. A., 7, 33.
 Cope, A., 8.
 Cox, W. V., 10, 15.
 Crosthwait, G. A., 9.
 Curtiss, C. F., 7, 8, 9, 66, 69, 77, 114, 115,
 124, 129, 131.
 Davenport, E., 7, 9, 33, 64, 66, 86, 89, 111,
 112, 113, 115, 116.
 Davidson, R. J., 117.
 Dinsmore, W., 9.
 Dixon, C. O., 9.
 Duggar, J. F., 7, 8, 9, 56, 66, 129.
 Ellis, C. E., 9.
 Erwin, A. T., 9.
 Fellows, G. E., 9, 28, 91, 106.
 Fields, J., 9.
 Finney, R. G., 9.
 Fisher, R. W., 9.
 Fortier, S., 8.
 Foster, L., 9.
 Foster, Mrs. L., 9.
 Frandsen, P., 9.
 Fraser, W. J., 9, 135.
 Frear, W., 8.
 French, H. T., 8, 9, 43, 56, 118.
 Galloway, B. T., 8.
 Gammon, B. O., 9.
 Gammon, W., 9.
 Garcia, F., 9.
 Gay, C. W., 9.
 Gibbs, W. D., 9.
 Goodell, H. H., 8.
 Hamilton, J. M., 9.
 Hansen, N. E., 119.
 Hardy, J. C., 7, 9, 33, 65, 66, 106.
 Harter, G. A., 9, 101.
 Hays, W. M., 7, 8, 9, 32, 33, 68, 69, 112,
 117, 123, 129.
 Hays, Mrs. W. M., 9.
 Hayward, H., 9, 15.
 Hedgecock, G. G., 9, 15.
 Henry, W. A., 8, 10, 43, 64, 65, 68, 83, 113,
 118.
 Herff, B. von, 9.
 Hills, J. L., 7, 10, 20, 66, 133.
 Holden, P. G., 9.
 Hooper, J. J., 9.
 Hopkins, C. G., 9, 30, 117, 118, 123, 124.
 Hunt, T. F., 7, 8, 56, 69.
 Hunt, T. S., 9.
 James, E. J., 9.
 Jenkins, E. H., 8, 9, 29, 31, 116, 130.
 Jesse, R. H., 8, 9, 84, 87.
 Jones, J. W., 9.
 Jordan, W. H., 7, 8, 9, 25, 27, 62, 66, 116,
 118, 129, 131.
 Kaufman, E. E., 9.
 Keffer, C. A., 10, 118.
 Keyser, A., 9.
 Kimbrough, J. M., 9.
 Klinck, L. S., 9.
 Knapp, G. N., 10.
 Knisely, A. L., 9.
 Lazenby, W. R., 8, 31.
 Liggett, W. M., 9, 66.
 Liggett, Mrs. W. M., 9.
 Linfield, F. B., 9, 135.
 Little, E. E., 9.
 Lyon, T. L., 9, 119, 124.
 MacLean, G. E., 28.
 MacLean, J. A., 9.
 Mayo, N. S., 10, 15, 129, 132.
 McClintock, J. E., 9.

- McKay, G. L., 9.
 McNeill, J. H., 9.
 Mead, E., 8, 10.
 Mell, P. H., 10.
 Merritt, M. L., 9.
 Miller, M. F., 9.
 Mumford, F. B., 9, 133.
 Neale, A. T., 8, 9, 117.
 Nichols, E. R., 7, 9, 66, 95, 106.
 Nichols, Mrs. E. R., 9.
 Nickols, R. C., 9.
 Owens, J. R., 9.
 Pammel, L. H., 9, 116, 118.
 Patterson, H. J., 7, 8, 9, 65, 117, 129.
 Patterson, J. K., 8, 9, 64, 65, 66, 99, 100.
 Patterson, Mrs. J. K., 9.
 Price, H. C., 9.
 Redding, R. J., 9, 118.
 Reynolds, M. H., 9.
 Rueda, R., 9.
 Rutherford, W. J., 9.
 Sandsten, E. P., 10.
 Saunders, W., 10, 69, 123.
 Scott, A., 9, 90, 98.
 Scott, A. C., 9, 87.
 Scovell, M. A., 7, 8, 9, 29, 65, 66, 67, 123, 129.
 Shamel, A. D., 8, 31.
 Smith, C. D., 9, 118, 131.
 Snyder, H., 9, 117, 121, 124.
 Snyder, J. L., 7, 9, 66, 106, 114, 115.
 Stevens, F. L., 9, 116.
 Stevenson, W. H., 9.
 Stimson, R. W., 7, 9, 66, 82, 98, 106.
 Stone, W. E., 8, 9, 65, 66, 68, 77, 79, 91, 106.
 Storms, A. B., 9, 104.
 Stubbs, J. E., 8.
 Summers, H. E., 9, 129.
 Thach, C. C., 9, 95, 98, 105.
 Thompson, W. O., 8, 9, 15, 33, 64, 79, 90, 99, 100, 106.
 Thorne, C. E., 9, 117, 122.
 Tinsley, J. D., 9.
 Tisdell, F. M., 10, 68.
 True, A. C., 7, 8, 20, 33, 56, 66.
 True, G. H., 9.
 True, Mrs. G. H., 9.
 Tyler, H. W., 8.
 Van Es, L., 9.
 Van Hise, C. R., 10, 63, 98.
 Vivian, A., 9.
 Voorhees, E. B., 7, 9, 20, 66.
 Waters, H. J., 8, 10.
 Watkins, L. W., 9, 15.
 Watkins, Mrs. L. W., 9.
 Webber, H. J., 8, 69.
 Wells, C., 9.
 Wessels, P. H., 9.
 West, F. L., 9.
 Wheeler, H. J., 8, 28, 29, 30, 66, 117, 136.
 White, F. S., 9.
 White, H. C., 7, 8, 9, 15, 19, 32, 42, 64, 66, 77, 88, 104, 106.
 White, Mrs. H. C., 9.
 Whitson, A. R., 8.
 Widtsoe, J. A., 10.
 Willcox, O. W., 9.
 Williams, W., 9.
 Wilson, J. W., 10.
 Wing, H. H., 8, 56.
 Withers, W. A., 8.
 Woods, C. D., 7, 8, 9, 29, 66, 77, 117, 129, 131.
 Worst, J. H., 9, 66.
 Zintheo, C. J., 9.



THE AGRICULTURAL EXPERIMENT STATIONS.

ALABAMA—

College Station: *Auburn*; J. F. Duggar.^a

Canebrake Station: *Uniontown*; J. M. Richeson.^b

Tuskegee Station: *Tuskegee*; G. W. Carver.^a

ALASKA—*Sitka*: C. C. Georgeson.^c

ARIZONA—*Tucson*: R. H. Forbes.^a

ARKANSAS—*Payetteville*: W. G. Vincenheller.^a

CALIFORNIA—*Berkeley*: E. W. Hilgard.^a

COLORADO—*Fort Collins*: L. G. Carpenter.^a

CONNECTICUT—

State Station: *New Haven*; E. H. Jenkins.^a

Storrs Station: *Storrs*; L. A. Clinton.^a

DELAWARE—*Newark*: A. T. Neale.^a

FLORIDA—*Lake City*: Andrew Sledd.^a

GEORGIA—*Experiment*: R. J. Redding.^a

HAWAII—

Federal Station: *Honolulu*; J. G. Smith.^c

Sugar Planters' Station: *Honolulu*; C. F. Eckart.^a

IDAHO—*Moscow*: H. T. French.^a

ILLINOIS—*Urbana*: E. Davenport.^a

INDIANA—*Lafayette*: A. Goss.^a

IOWA—*Ames*: C. F. Curtiss.^a

KANSAS—*Manhattan*: J. T. Willard.^a

KENTUCKY—*Lexington*: M. A. Scovell.^a

LOUISIANA—

State Station: *Baton Rouge*.

Sugar Station: *Audubon Park, New Orleans*.

North Louisiana Station: *Calhoun*; W. R. Dodson.^a

MAINE—*Orono*: C. D. Woods.^a

MARYLAND—*College Park*: H. J. Patterson.^a

MASSACHUSETTS—*Amherst*: H. H. Goodell.^a

MICHIGAN—*Agricultural College*: C. D. Smith.^a

MINNESOTA—*St. Anthony Park, St. Paul*: W. M. Liggett.^a

MISSISSIPPI—*Agricultural College*: W. L. Hutchinson.^a

MISSOURI—

College Station: *Columbia*; F. B. Mumford.^a

Fruit Station: *Mountain Grove*; P. Evans.^a

MONTANA—*Bozeman*: F. B. Linfield.^a

NEBRASKA—*Lincoln*: E. A. Burnett.^a

NEVADA—*Reno*: J. E. Stubbs.^a

NEW HAMPSHIRE—*Durham*: W. D. Gibbs.^a

NEW JERSEY—*New Brunswick*: E. B. Voorhees.^a

NEW MEXICO—*Mesilla Park*: L. Foster.^a

NEW YORK—

State Station: *Geneva*; W. H. Jordan.^a

Cornell Station: *Ithaca*; L. H. Bailey.^a

NORTH CAROLINA—*Raleigh*: B. W. Kilgore.^a

NORTH DAKOTA—*Agricultural College*: J. H. Worst.^a

OHIO—*Wooster*: C. E. Thorne.^a

OKLAHOMA—*Stillwater*: J. Fields.^a

OREGON—*Corvallis*: J. Withycombe.^a

PENNSYLVANIA—*State College*: H. P. Armsby.^a

PORTO RICO—*Mayaguez*: D. W. May.^a

RHODE ISLAND—*Kingston*: H. J. Wheeler.^a

SOUTH CAROLINA—*Clemson College*: P. H. Mell.^a

SOUTH DAKOTA—*Brookings*: J. W. Wilsen.^a

TENNESSEE—*Knoxville*: H. A. Morgan.^a

TEXAS—*College Station*: John A. Craig.^a

UTAH—*Logan*: J. A. Wiltsoe.^a

VERMONT—*Burlington*: J. L. Hills.^a

VIRGINIA—*Blacksburg*: A. M. Soule.^a

WASHINGTON—*Pullman*: E. A. Bryan.^a

WEST VIRGINIA—*Morgantown*: J. H. Stewart.^a

WISCONSIN—*Madison*: W. A. Henry.^a

WYOMING—*Laramie*: B. C. Buffum.^a

^a Director.

^b Assistant director.

^c Special agent in charge.

^a Acting director.

UNIVERSITY OF FLORIDA



3 1262 08927 9037